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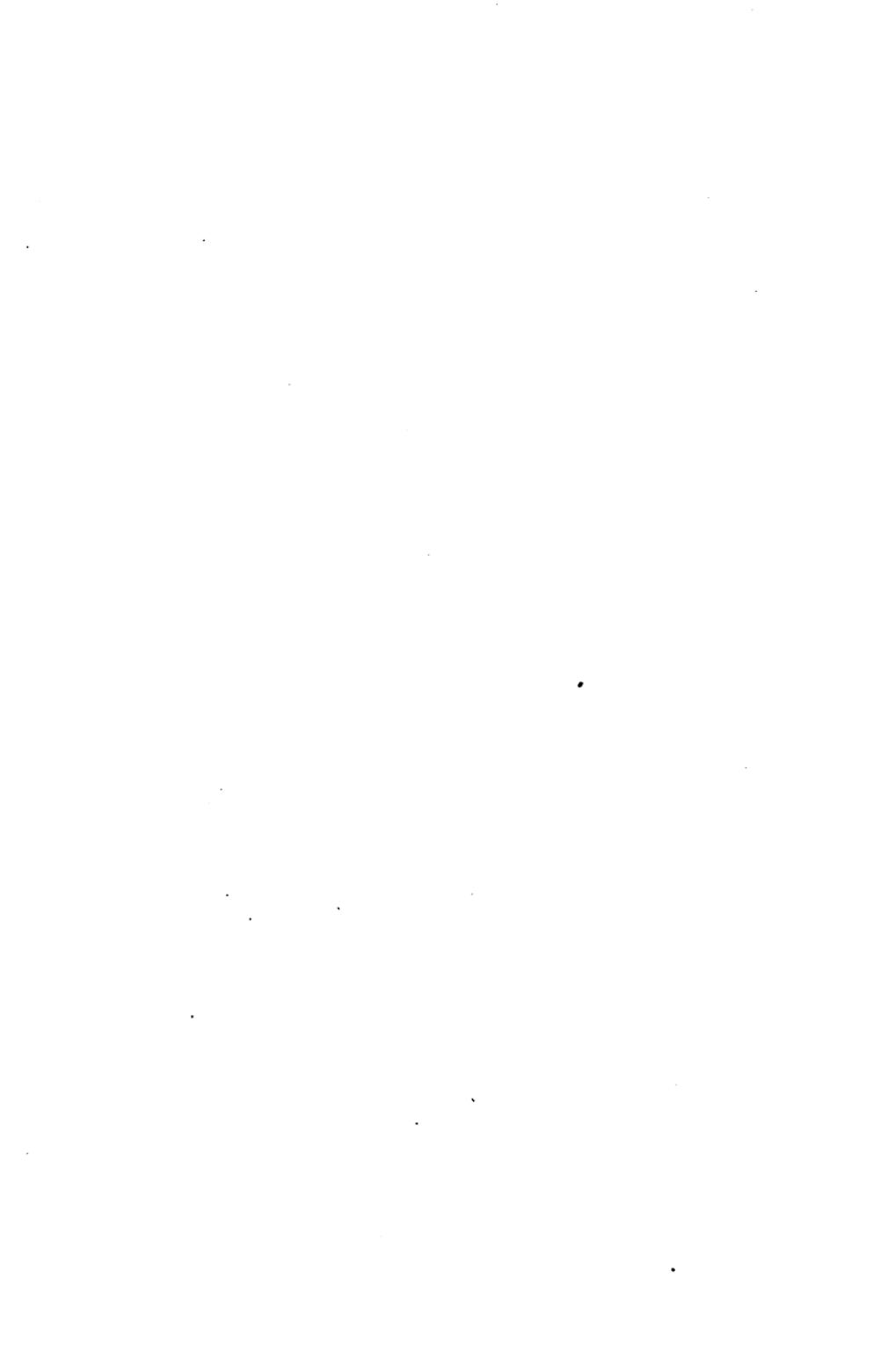
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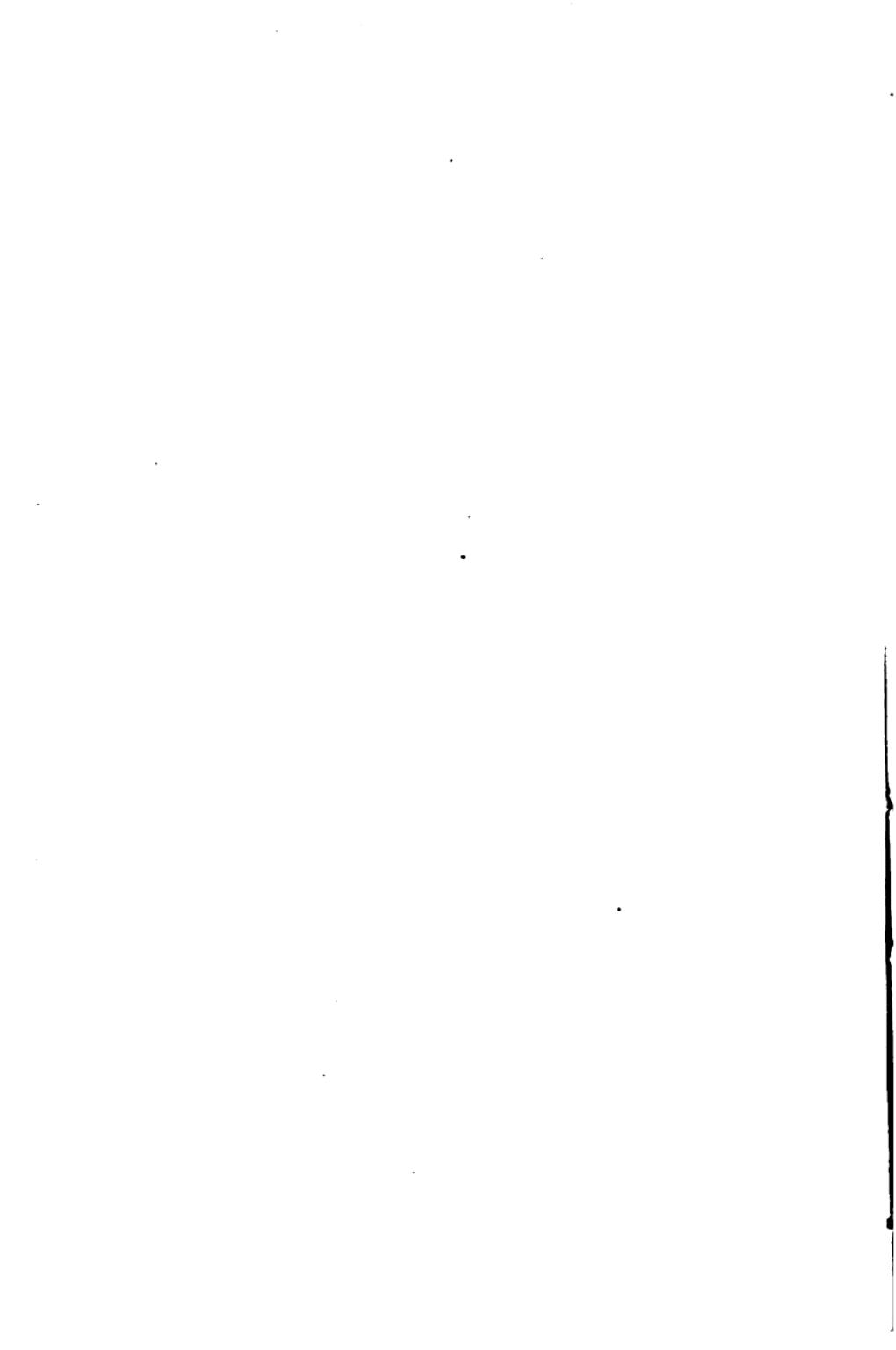
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**W. OPHULS.**







ATLAS AND PRINCIPLES  
OF  
BACTERIOLOGY  
AND TEXT-BOOK OF  
SPECIAL BACTERIOLOGIC DIAGNOSIS

BY  
PROF. DR. K. B. LEHMANN  
Director of the Hygienic Institute in Würzburg

AND  
R. O. NEUMANN, DR. PHIL. and MED.  
Assistant in the Hygienic Institute in Würzburg

AUTHORIZED TRANSLATION FROM THE SECOND  
ENLARGED AND REVISED GERMAN EDITION

EDITED BY  
GEORGE H. WEAVER, M.D.  
Assistant Professor of Pathology, Rush Medical College, Chicago

PART I—ATLAS  
*With 632 Figures on 69 Lithographic Plates*

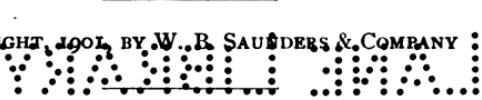
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1901

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1901

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Bacillus gangrænæ pulpæ. Arkövy.

69. Leptothrix epidermidis. Biz.





Tab. 1.

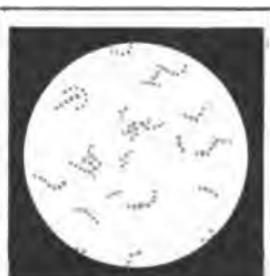
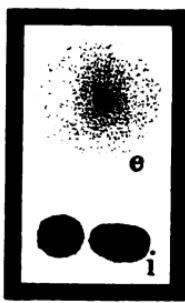
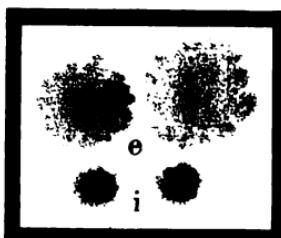
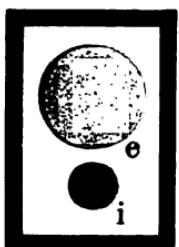


PLATE I.

**Streptococcus pyogenes.** Rosenbach.

- I. *Agar streak culture*, ten days at 37°.
- II. *Gelatin stab culture*, six days at 22°. So vigorous a growth does not often occur.
- III. *Agar stab culture*, six days at 37°. Stab canal.
- IV. *Agar stab culture*, six days at 37°. Surface growth.
- V. *Gelatin plate*, six days at 22°.
- VI. *Gelatin plate*, six days at 22°.  $\times 70$ . Somewhat abnormal form with irregular borders. The larger colonies are superficial; the smaller, deep.
- VII. *Gelatin plate*, six days at 22°.  $\times 70$ . Common form. The upper, superficial; the lower, deep.
- VIII. *Agar plate*, eight days at 37°.  $\times 50$ . Larger colony superficial; smaller colonies, deep.
- IX. *Microscopic preparation* from a two days' bouillon culture at 37°.  $\times 700$ . The individual cocci are usually more regularly round.
- X. *Microscopic preparation* from a two days' agar culture. Shorter chains.  $\times 1000$ .
- XI. *Microscopic preparation*, designated *Streptococcus conglomeratus*. Smear preparation from the blood of the spleen from a case of scarlatina. Copied from Kurth (Kaiserl. Gesundheitsamt., Bd. VII, cfr. XV, 6 and 8).
- XII. *Chains of streptococci*, before and during division. Highly magnified.



XII.

PLATE 2.

**Streptococcus lanceolatus.** Gamaleia. (Diplococcus pneumoniae A. Fränkel.) (Pneumococcus.)

- I. *Gelatin stab culture*, ten days at 22°.
- II. *Agar streak culture*, four days at 37°.
- III. *Agar stab culture*, four days at 37°. Stab canal.
- IV. *Agar stab culture*, four days at 37°. Surface growth.
- V. *Agar plate*, three days at 37°. Natural size.
- VI. *Agar plate*, three days at 37°.  $\times 50$ . Superficial colony. The darker colony lies near the surface.
- VII. *Agar plate*, three days at 37°.  $\times 50$ . Deep colonies.
- VIII. *Gelatin plate*, eight days at 22°. The upper colony is superficial; the lower ones, deep.
- IX. *Smear preparation* from pneumonic sputum.  
 $\times 1000$ .
- X. *Pure culture* from a three days' old agar plate.  
 $\times 1000$ .
- XI. *Microscopic preparations*: (a) Diplococci as single pairs and in chains. Highly magnified. (b) Diplococci surrounded by gelatinous capsules.



XI.

Tab. 2.

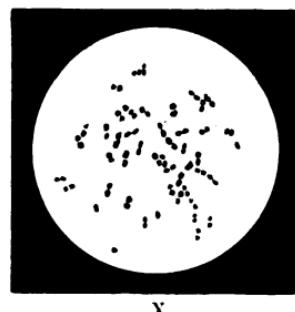
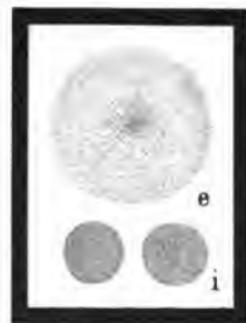
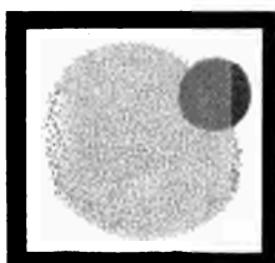




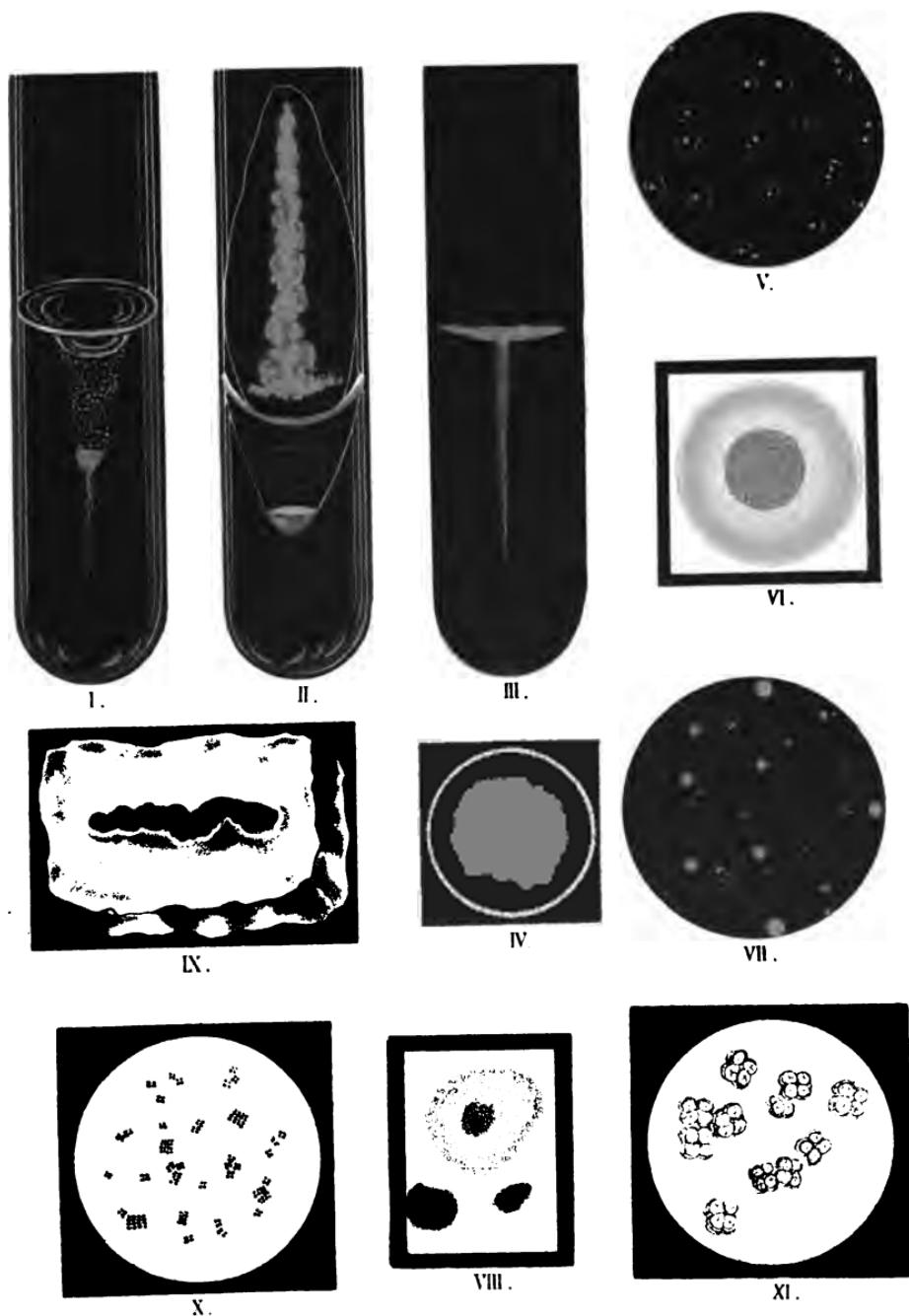


PLATE 4.

*Sarcina aurantiaca*. Flügge.

- I. *Gelatin stab culture*, six days at 22°.
- II. *Agar streak culture*, five days at 22°. The color is not so red in all cases; usually light orange. This is also true of the agar stab and potato cultures.
- III. *Agar stab culture*, six days at 22°. Stab canal.
- IV. *Agar stab culture*, six days at 22°. Surface growth.
- V. *Gelatin plate*, five days at 22°. Natural size. The gray zone about the colonies indicates a depression.
- VI. *Gelatin plate*, five days at 22°.  $\times$  60. A colony in the early stage. The gray ring represents a zone where it is sinking in.
- VII. *Agar plate*, five days at 22°. Natural size.
- VIII. *Agar plate*, five days at 22°.  $\times$  60. Upper colony, superficial; lower colonies, deep. The superficial colonies usually become opaque toward the center.
- IX. *Potato culture*, eight days old.
- X. *Microscopic preparation*. Pure culture from agar.  $\times$  1000. Stained with fuchsin, differentiated with acetic acid.
- XI. *Microscopic preparation*. Pure culture in bouillon.  $\times$  1000. Unstained, partly schematic.

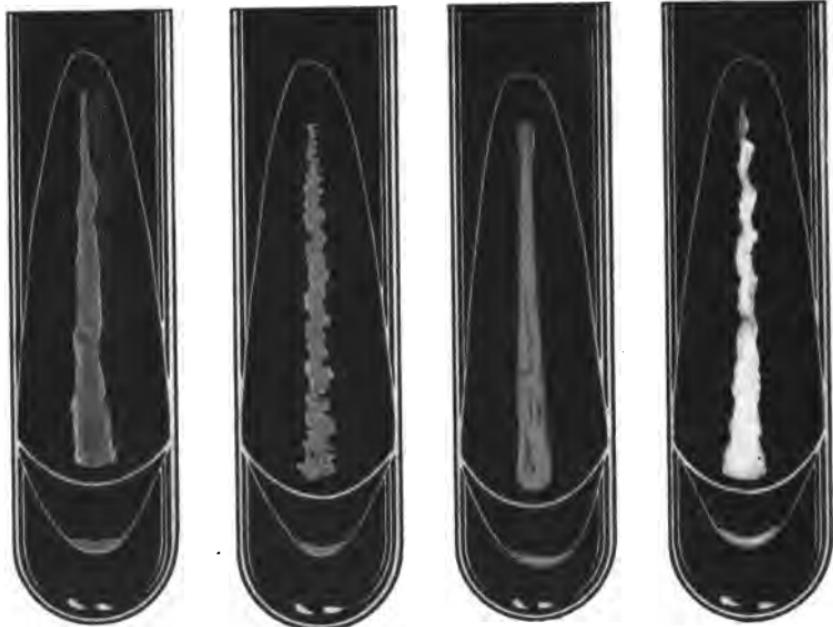
Tab. 4.







Tab. 5.

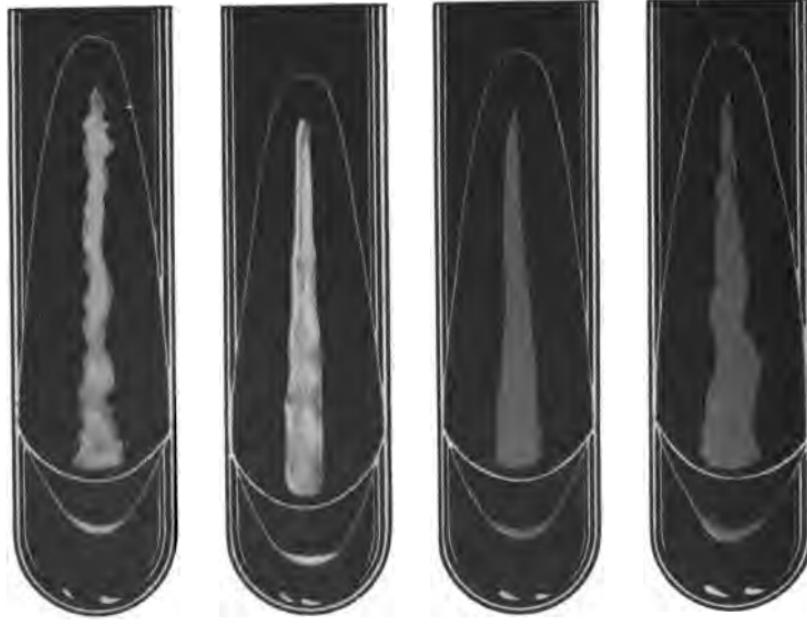


I.

II.

III.

IV.



V.

VI.

VII.

VIII.

PLATE 5.  
Various Sarcinæ.

- I. **Sarcina cervina** Stubenrath. Agar streak culture, fifteen days at 22°, isolated from gastric contents.
- II. **Sarcina pulmonum** Virchow. Agar streak culture, fifteen days at 37°.
- III. **Sarcina erythromyxa** Král. Agar streak culture, thirty days at 22°, isolated from beer.
- IV. **Sarcina lutea** Flügge. Agar streak culture, ten days at 22°, isolated from stomach.
- V. **Sarcina aurantiaca** Flügge. Agar streak culture, ten days at 22°, isolated from yeast.
- VI. **Sarcina rosea** Schröter, emended by Zimmermann. Agar streak culture, twenty-five days at 22°, isolated from light beer.
- VII. **Micrococcus radius** Lehm. and Neum. Agar streak culture, fifteen days at 22°, isolated from air.
- VIII. **Sarcina canescens** Stubenrath. Agar streak culture, twenty days at 22°, isolated from the stomach.

PLATE 6.

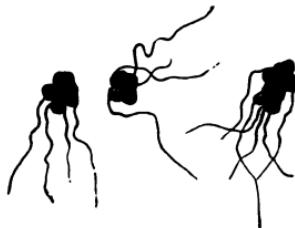
**Micrococcus luteus.** Ferd. Cohn, emended by Lehm. and Neum.

- I. *Gelatin stab*, six days at 22°.
- II. *Gelatin plate*, three days at 22°.  $\times 50$ . To the left, superficial; to the right, a deep colony.
- III. *Microscopic preparation*.  $\times 1000$ . From a two-days'-old agar plate. Often the micrococci are grouped in tetrads.
- IV. *Agar plate*, five days at 22°. Natural size. The colonies are sometimes more yellow.
- V. *Potato culture*, six days at 22°. Sometimes it has a dull luster.

**Sarcina pulmonum.** Virchow. Hauser.

(Pulmonary Sarcina.)

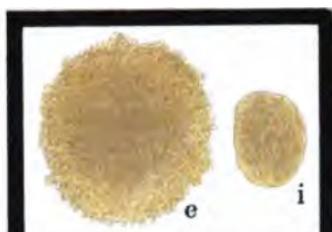
- VI. *Gelatin stab*, twenty days at 22°. The stab is in reality more gray.
- VII. *Agar streak*, twenty days at 22°.
- VIII. *Gelatin plate*, twenty days at 22°. To the left, a superficial; to the right, a deep colony.
- IX. *Potato culture*, twenty days at 22°.
- X. *Stained flagella*. Highly magnified.



X.



I.



II.



III.



IV.



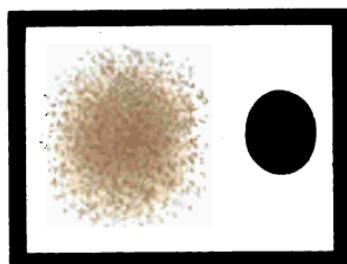
V.



VI.



VII.

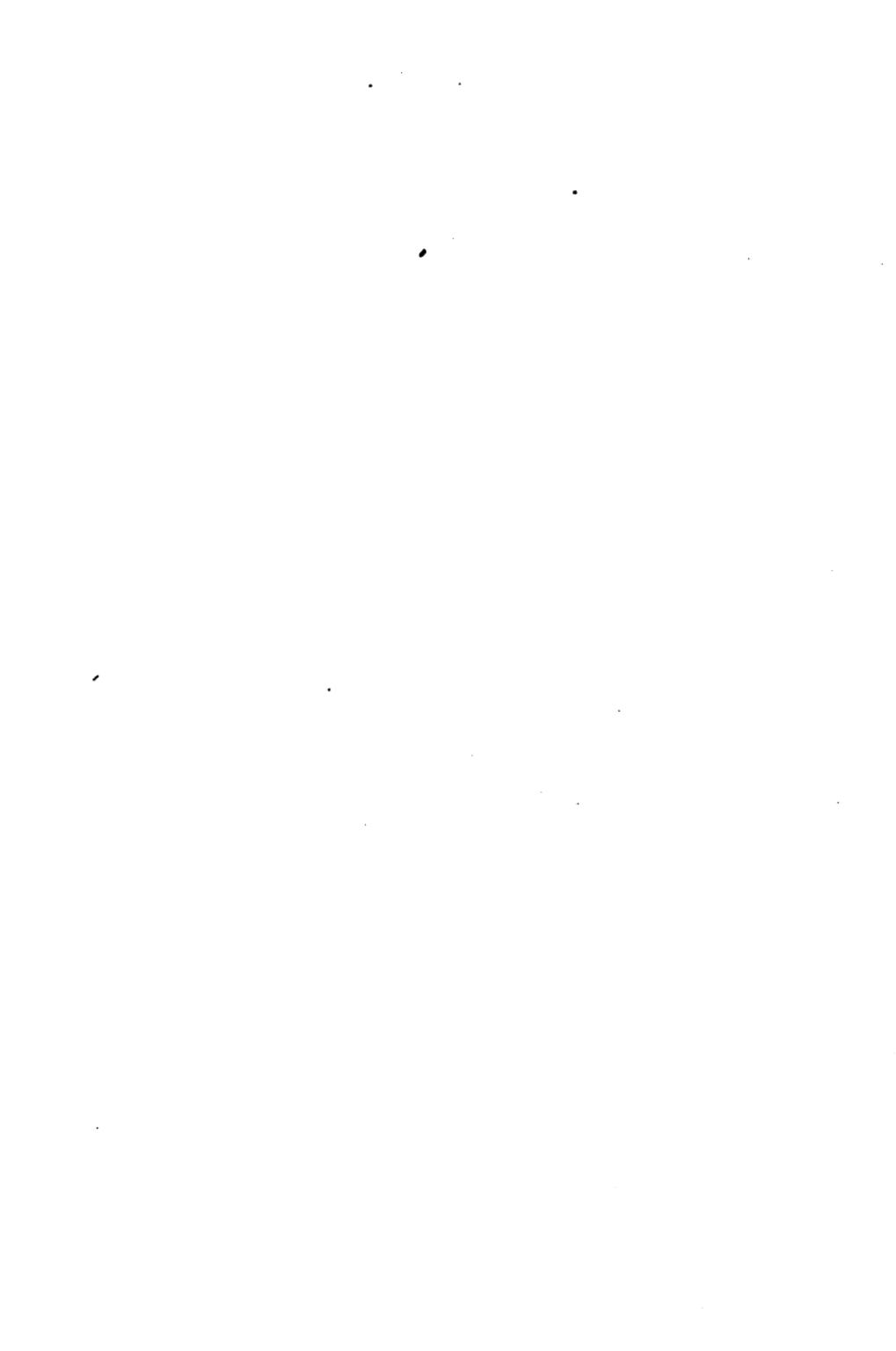


VIII.



IX.







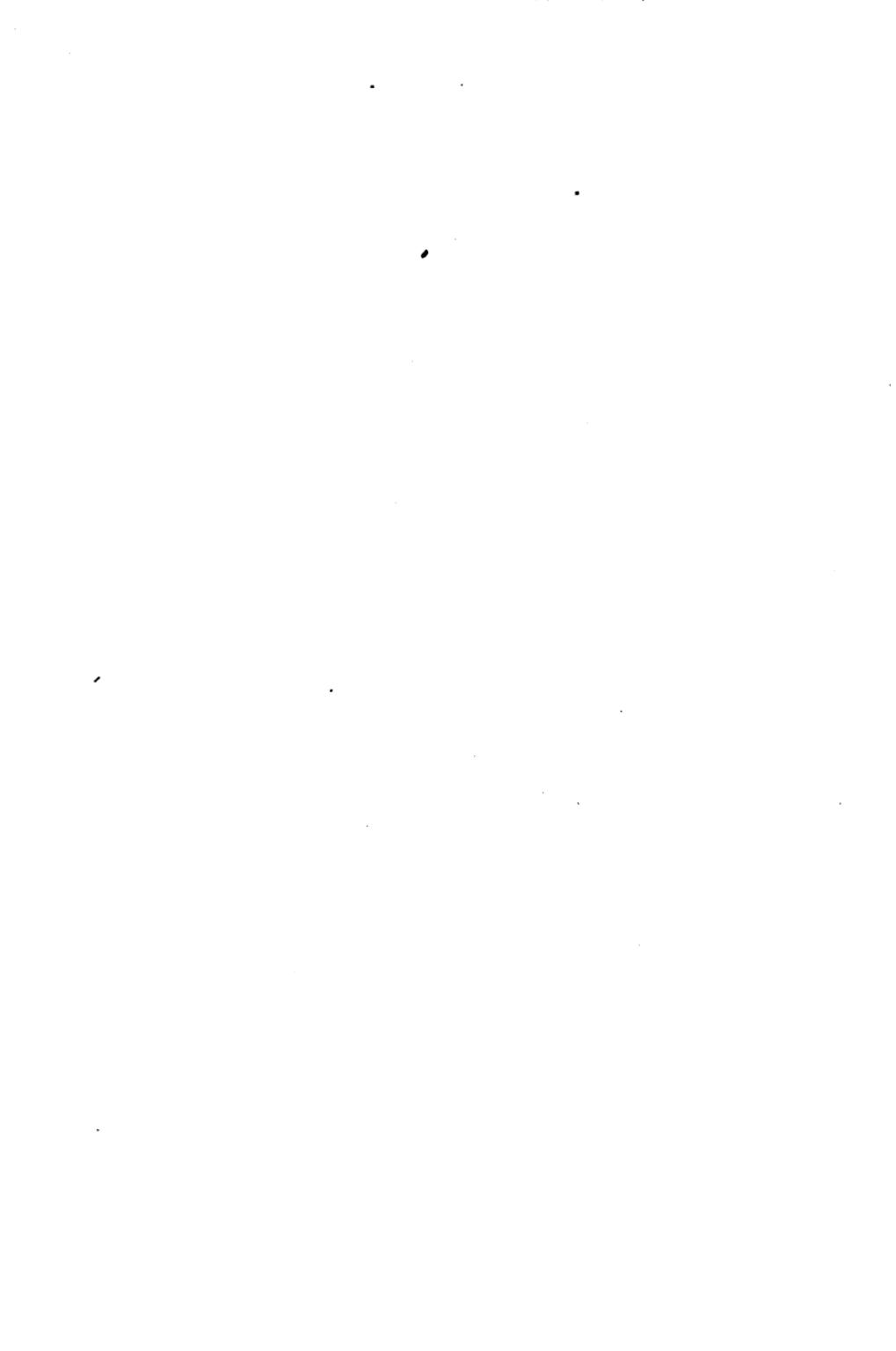


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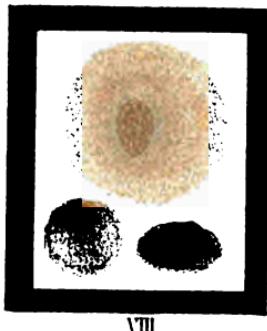
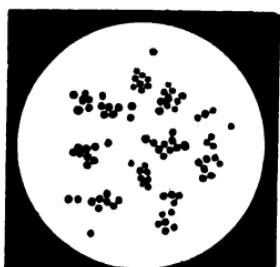
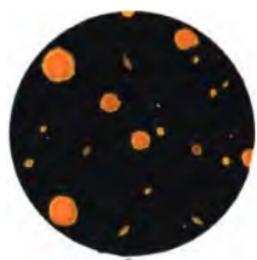
**Micrococcus pyogenes** *a* **aureus.** (Rosenbach.) Lehm.  
and Neum.

(*Staphylococcus aureus* Ros.)

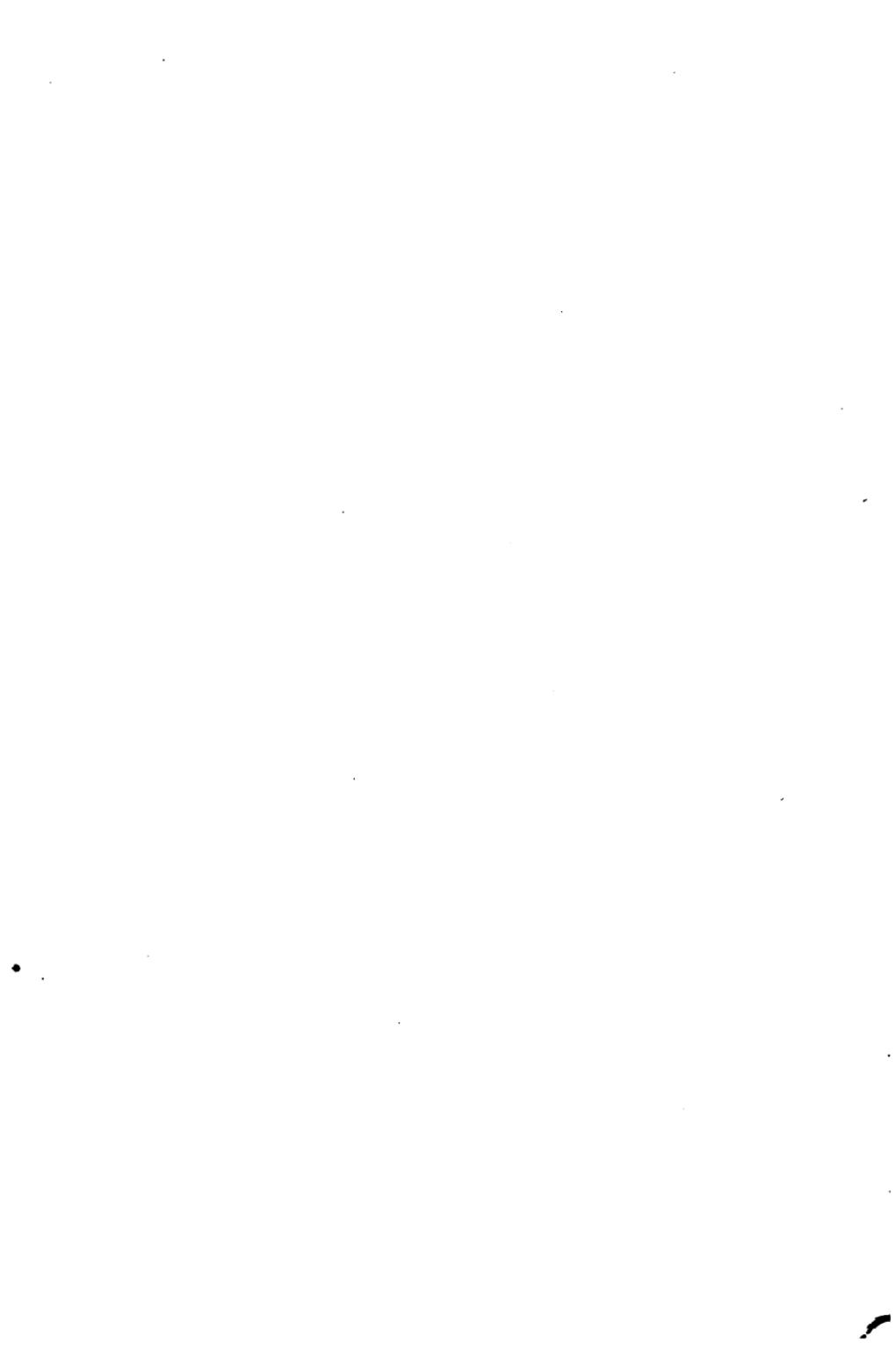
- I. *Gelatin stab culture*, six days at 22°.
- II. *Agar streak culture*, five days at 22°.
- III. *Agar stab culture*, five days at 22°. Stab canal.
- IV. *Agar stab culture*, five days at 22°; surface growth.
- V. *Agar plate culture*, six days at 22°, natural size.  
Superficial and deep colonies.
- VI. *Agar plate*, six days at 22°. × 60. Small superficial colony.
- VII. *Gelatin plate*, four days at 22°, natural size.  
Superficial and deep colonies.
- VIII. *Gelatin plate*, four days at 22°. × 60. Superficial and deep colonies.
- IX. *Potato culture*, six days at 22°.
- X. *Microscopic preparation.* × 1000. From an agar culture, two days old, at 22°.
- XI. *Microscopic preparation.* Single cocci, before, during, and after division. × 1500.



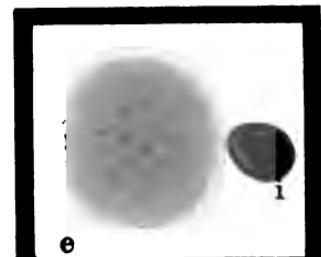
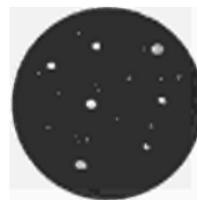
XI.







Tab. 9.



W.

PLATE 9.

**Micrococcus pyogenes  $\gamma$  albus.** (Rosenbach.) L. and N.  
(*Staphylococcus albus* Rosenbach.)

- I. *Agar streak culture*, four days at 22°.
- II. *Gelatin stab culture*, five days at 22°.

**Micrococcus pyogenes  $\beta$  citreus.** (Rosenbach.) L. and N.  
(*Staphylococcus citreus* Rosenbach.)

- III. *Agar streak culture*, six days at 22°.

**Micrococcus candidans.** Flügge.

- IV. *Gelatin stab culture*, six days at 22°.
- V. *Gelatin plate*, eight days at 22°.
- VI. *Gelatin plate*, six days at 22°.  $\times$  50. To the left a superficial, to the right a deep colony.
- VII. *Potato culture*, ten days at 22°.
- VIII. *Microscopic preparation* from a two-days'-old culture on agar.  $\times$  700.

PLATE 10.

*Micrococcus gonorrhœæ*. Neisser. Bumm.

I. *Agar streak culture*, ascites-glycerin-agar, three days at 37°.

II. *Agar plate*, forty-eight hours at 37°.  $\times$  60. Superficial colonies. The agar was poured out, and blood from the finger-tip smeared upon it, and upon this was placed the gonorrhœal pus. The reddish places are blood. The colonies of the gonococcus grow principally at the periphery of the blood smear.

III. *Serum-agar plate*. The upper colony three days, the lower twenty-four hours, at 37°.  $\times$  60. Superficial colonies. One c.c. of human serum was added to the agar.

IV. *Serum-agar plate*. The same colonies after eight days.

V. *Ascites-glycerin-agar plate*, forty-eight hours at 37°.  $\times$  60. Superficial colonies of a pure culture from blennorrhœal pus. To 5 c.c. of a 2% agar, containing 5% of glycerin, 1.5 c.c. of human ascites-fluid were added.

VI. *Ascites-glycerin-agar plate*, forty-eight hours, at 37°.  $\times$  60. Superficial colonies. After pouring out the agar, blennorrhœal pus was smeared upon it. The darker septa are pus (pushed together by the growing colonies); also the material at the periphery of the colonies.

VII. *Smear preparation from gonorrhœal pus*.  $\times$  1000. Stained with methylene-blue.

VIII. *Smear preparation from blennorrhœal pus*.  $\times$  1000. Stained with methylene-blue. A pus cell in which lie the micrococci, almost always in fours in capsules. The preparation contains a great many micrococci thus situated.

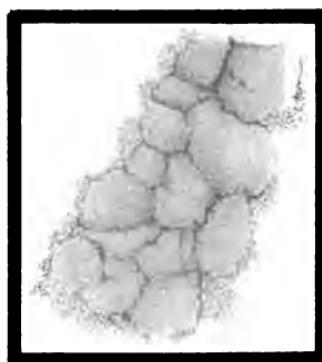
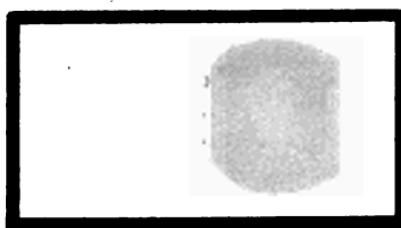
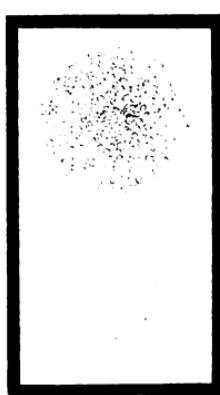
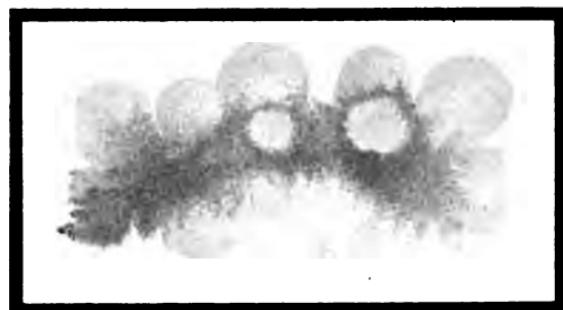
IX. *Smear preparation from blennorrhœal pus*.  $\times$  1000. Stained with methylene-blue and eosin.

X. *Micrococci*, highly magnified, schematic.



X.

Tab. 10.







Tab. 11.

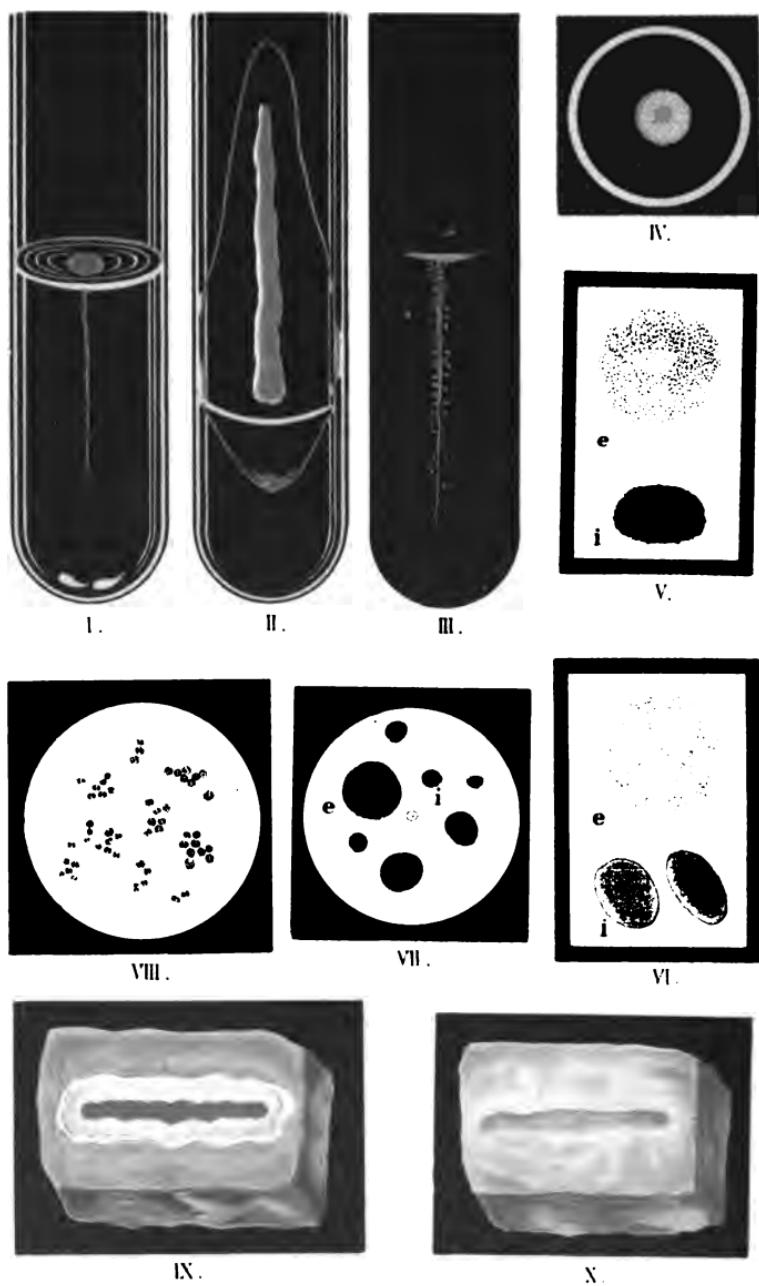


PLATE II.

**Micrococcus roseus.** (Bumm.) Lehm. and Neum.  
(Diplococcus roseus Bumm.)

I. *Gelatin stab culture*, twenty days at room temperature.

II. *Agar streak culture*, thirty days at room temperature. The white reflex on the right side is not always so marked.

III. *Agar stab culture*, ten days at 22°. Stab canal.

IV. *Agar stab culture*, ten days at 22°. Surface growth.

V. *Agar plate*, twelve days at 22°.  $\times 50$ . Above, a superficial; below, a deep colony.

VI. *Agar plate*, fourteen days at 22°.  $\times 50$ . More delicate structure. Above, a superficial; below, deep colonies.

VII. *Gelatin plate*, eight days at 22°.  $\times 50$ . Superficial and deep colonies.

IX. *Potato culture*. A culture of the Diploc. roseus, grown upon a culture of anthrax; ten days at room temperature.

X. *Potato culture*, twenty days at room temperature.

XIII. *Microscopic preparation*, from three-days'-old agar culture.  $\times 1000$ . The cocci are undergoing division.

PLATE 12.

**Bacterium septicæmiæ hæmorrhagicæ.** Hüppe.  
(Chicken Cholera, Rabbit Septicemia, etc.)

- I. *Gelatin stab culture*, seven days at 22°.
- II. *Agar streak culture*, seven days at 22°.
- III. *Agar plate*, five days at 22°. Natural size.
- IV. *Agar plate*, five days at 22°.  $\times$  60. Superficial colony. Compare also Plate 14, vi; Plate 17, vi; Plate 18, VII.
- V. *Agar plate*, five days at 22°.  $\times$  60. Deep colonies.
- VI. *Gelatin plate*, five days at 22°. Natural size.
- VII. *Gelatin plate*, five days at 22°.  $\times$  90. Deep colonies.
- VIII. *Gelatin plate*, five days at 22°.  $\times$  90. Superficial colony. Compare also Plate 14, VIII; Plate 17, I; Plate 16, VIII; Plate 19, III, IV, VII.
- IX. *Microscopic preparation*.  $\times$  1000. Pure culture from agar plate.
- X. *Single bacteria*. Highly magnified. Schematic.



X.

Tab. 12.



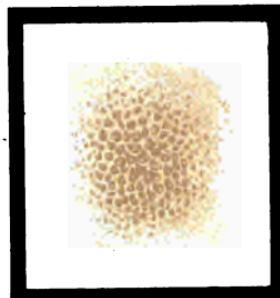
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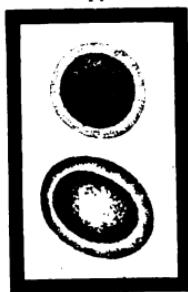
II.



III.



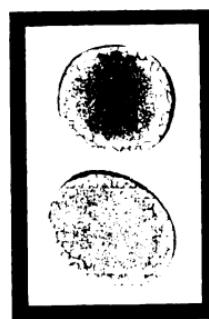
IV.



V.



VI.



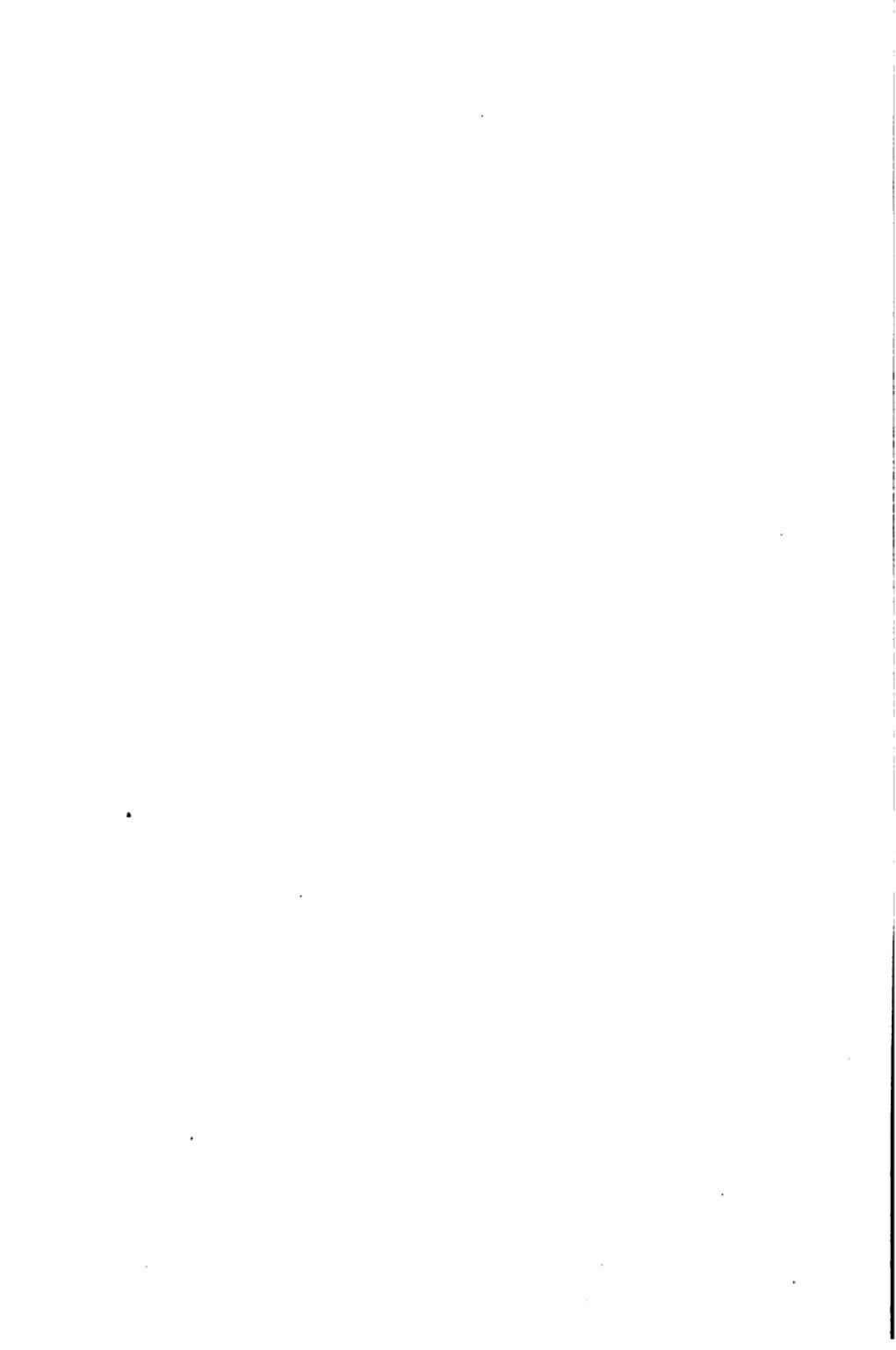
VII.



VIII.



IX.



Pestos

**Tab. 13.**

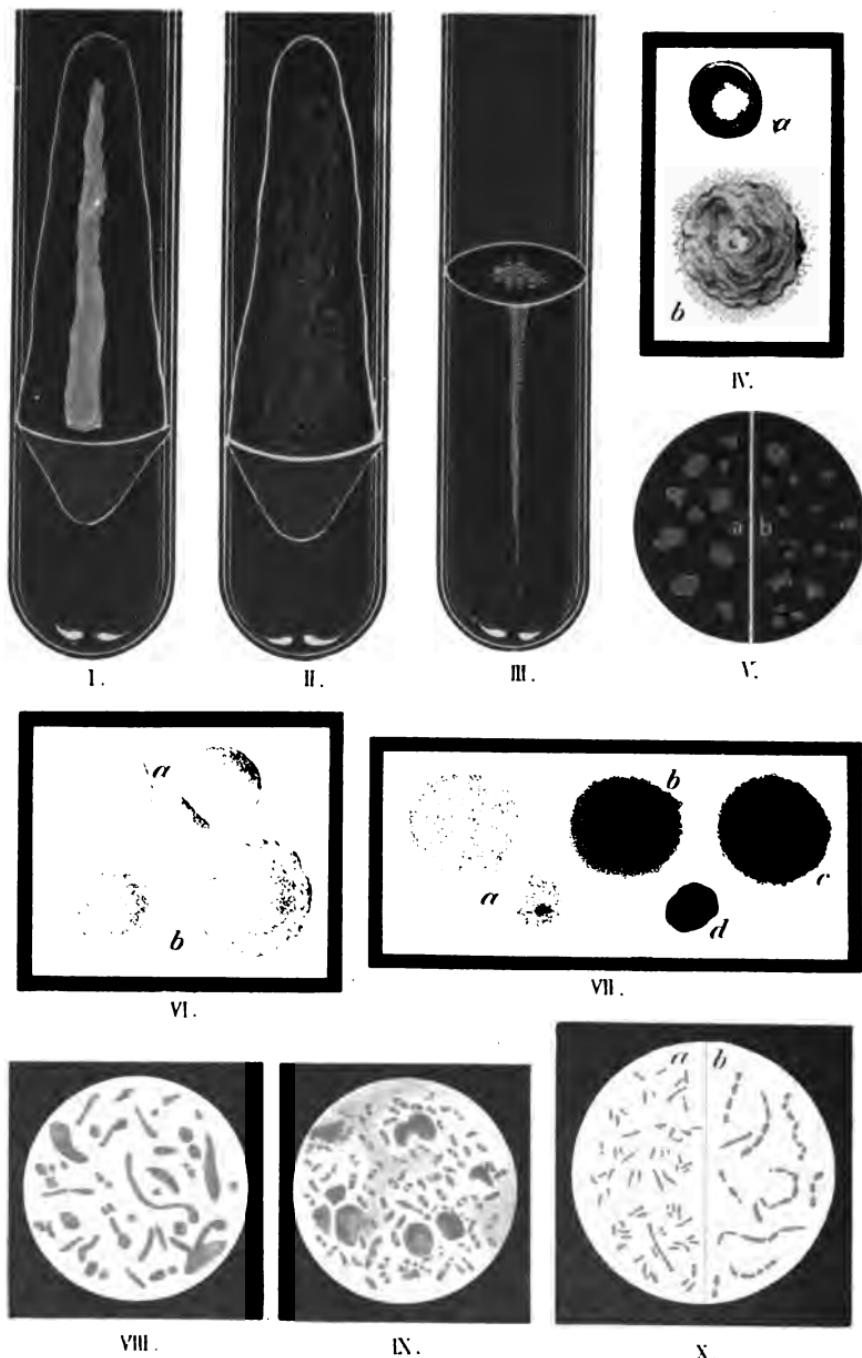


PLATE 13.

**Bacterium pestis.** Lehm. and Neum.

I. *Streak culture* (ascites-glycerin-agar), three days at 37°.

II. *Streak culture* (agar), forty-eight hours at 37°.  
(After a culture of Dr. Dieudonné, preserved with formalin.)  
The streak was made with the juice direct from a bubo.  
The transparent, dewdrop-like growth is characteristic.

III. *Stab culture* (gelatin), six days at 22°. The growth consists of minute, waxy, markedly elevated colonies, which become confluent; also the same upon the gelatin plate (v, b).

IV. *Plate culture* (gelatin), six days at 22°. × 60. (a)  
Deep colony; (b) superficial colony.

V. *Plate culture*: (a) Glycerin-agar, three days at 37°.  
Natural size. Superficial colonies. (b) Gelatin, six days at 22°. Natural size. Superficial colonies. Compare what is said under Fig. III.

VI. *Plate culture* (agar), forty-eight hours at 37°. × 60.  
× 60. Superficial colonies. They correspond to the dewdrop-like colony in the agar streak culture (ii). (a)  
Younger, (b) older colonies.

VII. *Plate cultures*, forty-eight hours at 37°. × 60.

(a) Ordinary agar  
(b) Glycerin-agar  
(c) Ascites-glycerin-agar  
(d) Ascites-glycerin-agar, deep colony. } Superficial colonies.

The crumbly character of cultures after being cultivated in contrast to very fresh cultures is to be noted (compare vi).

VIII. *Microscopic preparation*, three days at 37° on glycerin-agar. × 1000. Stained with fuchsin. Involution forms.

IX. *Microscopic preparation*: Smear from the juice of a bubo. × 1000. Stained with methylene-blue. (From a preparation of Dr. Dieudonné.)

X. *Microscopic preparation*: (a) Ordinary agar, twenty-four hours at 37°. × 1000. Stained with fuchsin.  
(b) Ordinary bouillon, twenty-four hours at 37°. × 1000. Stained with fuchsin.

PLATE 14.

**Bacterium acidi lactici.** Hüppe. (Lactic Acid Bacillus.)

I. *Gelatin stab culture*, five days at 22°. The stab canal in nature is somewhat whiter.

II. *Agar streak culture*, five days at 22°.

III. *Agar stab culture*, three days at 22°. Stab canal.

IV. *Agar stab culture*, three days at 22°. Surface growth.

V. *Agar plate*, three days at 22°. Natural size.

VI. *Agar plate*, three days at 22°.  $\times 50$ . Upper colony superficial, lower colonies deep. Compare also Plate 18, VII.

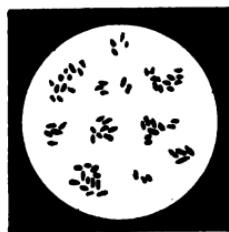
VII. *Gelatin plate*, two days at 22°. Natural size.

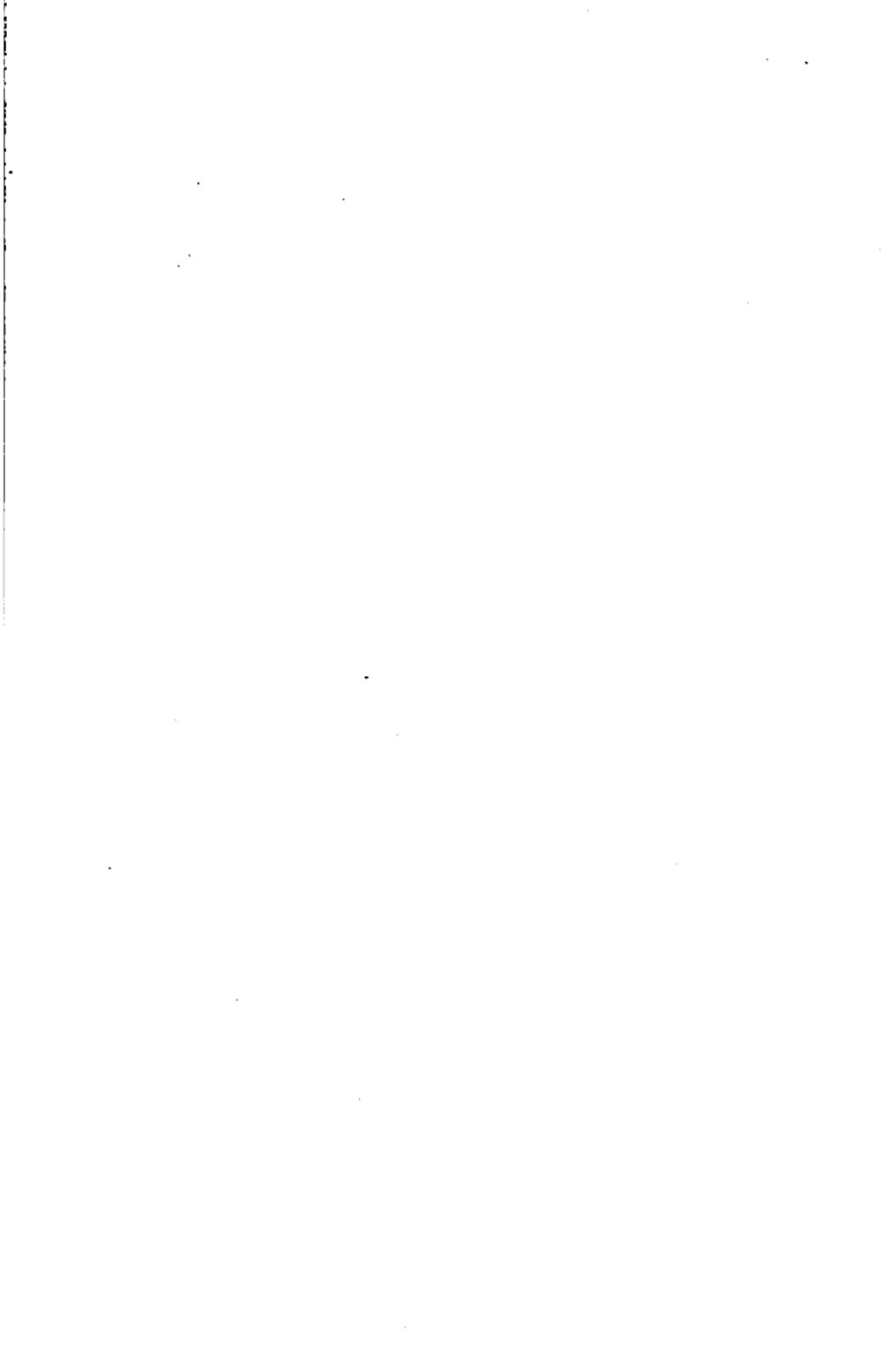
VIII. *Gelatin plate*, two days at 22°.  $\times 50$ . Upper colony superficial, lower colonies deep. The superficial colonies may vary very much. Compare also Plate 16, VIII, IX; Plate 17, I, II; Plate 19, IV, VII.

IX. *Microscopic preparation*. Pure culture from an agar colony.  $\times 800$ .

X. *Potato culture*, six days at 22°. The air-bubbles on the surface often cover it completely.

Tab. 14.







Tab. 15.

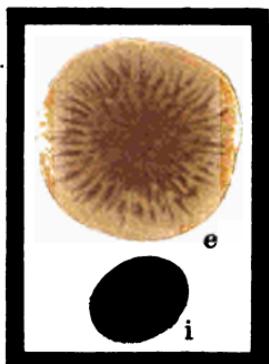
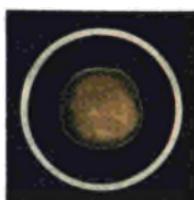


PLATE 15.

**Bacterium pneumoniae.** Friedländer. (Friedländer's Pneumonia Bacillus.)

- I. *Agar streak culture*, four days at 22°.
- II. *Gelatin stab culture*, ten days at 22°.
- III. *Agar stab culture*, four days at 22°. Stab canal.
- IV. *Agar stab culture*, four days at 22°. Surface growth.
- V. *Gelatin plate*, three days at 22°. Natural size.
- VI. *Agar plate*, two days at 22°.  $\times$  60. The brown whetstone-shaped colony is deep.
- VII. *Gelatin plate*, three days at 22°.  $\times$  50. Upper, superficial; lower, deep colony.
- VIII. *Agar plate*, four days at 22°. Natural size. The delicate gray colonies are deep; also the smallest colonies. One colony in the reproduction has turned out yellowish.
- IX. *Microscopic preparation*. Pure culture from an agar plate.  $\times$  800. Stained with fuchsin.
- X. *Microscopic preparation*. Smear preparation from sputum.  $\times$  800. Stained with fuchsin.
- XI. *Potato culture*, six days.

PLATE 16.

**Bacterium typhi.** Eberth. Gaffky. (Typhoid Bacillus.)

- I. *Agar stab culture*, three days at 22°. Stab canal.
- II. *Agar stab culture*, three days at 22°. Surface growth.
- III. *Gelatin stab culture*, eight days at 22°. Stab canal.
- IV. *Gelatin stab culture*, eight days at 22°. Surface growth.
- V. *Agar streak culture*, four days at 22°. Compare also Plate 18, III.
- VI. *Gelatin streak culture*, three days at 22°. Compare also Plate 18, II.
- VII. *Gelatin plate*, thirty-six hours at 22°. Deep colony. Compare also Plate 14, VIII; Plate 19, V.
- VIII. *Gelatin plate*, thirty-six hours at 22°. Superficial colony. Compare also Plate 14, VIII; Plate 19, III.
- IX. *Gelatin plate*, four days at 22°. Superficial colony. Compare also Plate 19, IV, VII.

Tab. 16.

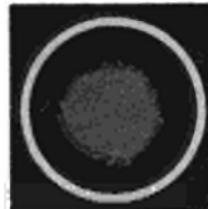
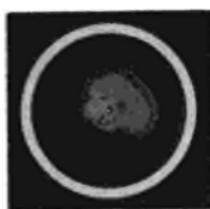


PLATE 16.

**Bacterium typhi.** Eberth. Gaffky. (Typhoid Bacillus.)

- I. *Agar stab culture*, three days at 22°. Stab canal.
- II. *Agar stab culture*, three days at 22°. Surface growth.
- III. *Gelatin stab culture*, eight days at 22°. Stab canal.
- IV. *Gelatin stab culture*, eight days at 22°. Surface growth.
- V. *Agar streak culture*, four days at 22°. Compare also Plate 18, III.
- VI. *Gelatin streak culture*, three days at 22°. Compare also Plate 18, II.
- VII. *Gelatin plate*, thirty-six hours at 22°. Deep colony. Compare also Plate 14, VIII; Plate 19, V.
- VIII. *Gelatin plate*, thirty-six hours at 22°. Superficial colony. Compare also Plate 14, VIII; Plate 19, III.
- IX. *Gelatin plate*, four days at 22°. Superficial colony. Compare also Plate 19, IV, VII.

Tab. 16.

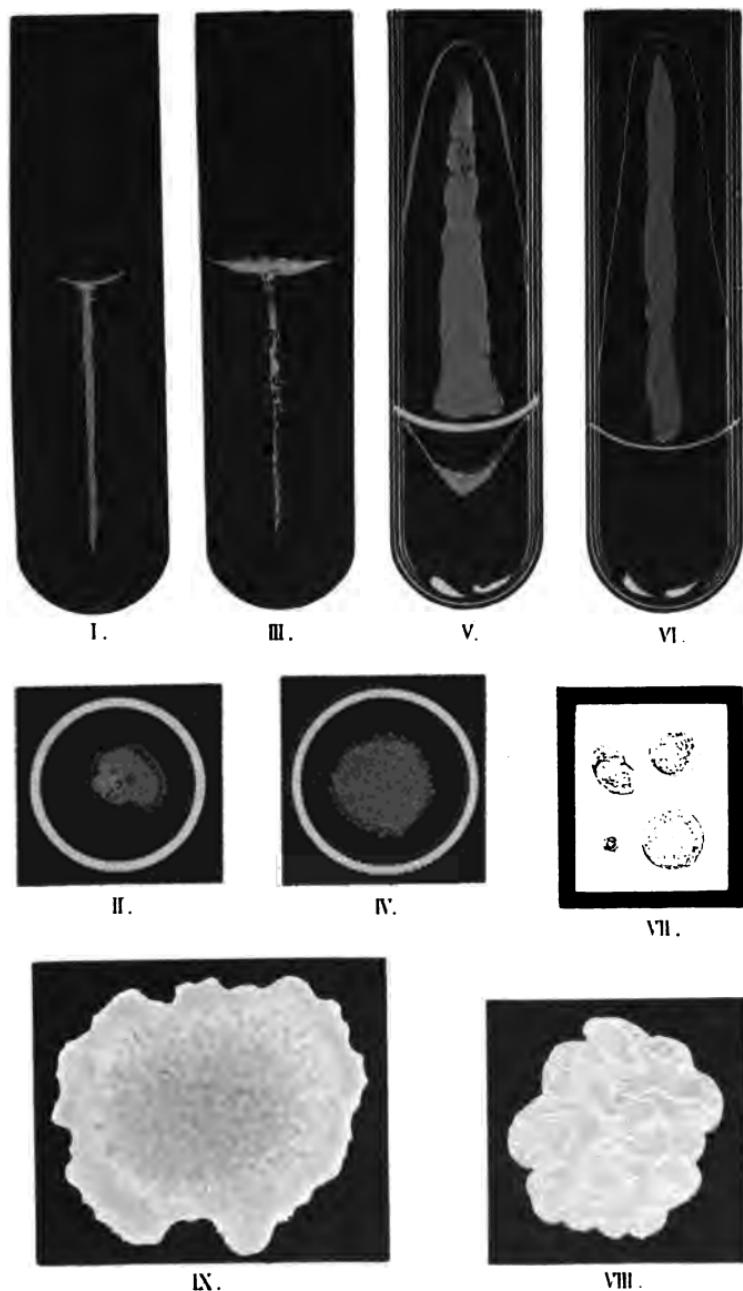






PLATE 18.

*Bacterium coli* (Escherich). L. and N.

I. *Gelatin stab culture*, ten days at 22°.

II. *Gelatin streak culture*, four days at 22°. In nature is transparent, resembling mother-of-pearl in iridescence. Compare also Plate 16, vi.

III. *Agar streak culture*, four days at 22°. Compare also Plate 16, v.

IV. *Agar stab culture*, two days at 22°. Stab canal.

V. *Agar stab culture*, two days at 22°. Surface growth.

VI. *Agar plate*, four days at 22°.  $\times 60$ . Deep colonies. Compare also Plate 14, vi.

VII. *Agar plate*, four days at 22°.  $\times 60$ . Part of a superficial colony. May also occasionally present forms like the bacillus acidi lactici. Compare Plate 12, iv; Plate 14, vi; Plate 17, vi.

VIII. *Agar plate*, three days at 22°. Natural size.

IX. *Potato culture*, five days at 22°. May also be paler or more deeply colored.

X. *Bacteria with long flagella of Bacterium brassicæ acidæ*.  $\times 1000$ . Stained according to Löffler.

XI. *Bacterium of pigeon diphtheria surrounded by flagella*.  $\times 1000$ . Stained according to Löffler.

XII. *Bacteria with one flagellum, rarely two flagella, of Bact. coli.  $\beta$  unipolaris*.  $\times 1000$ . Stained according to Löffler.



X.



XI.



XII.

Tab. 18.



I.



II.



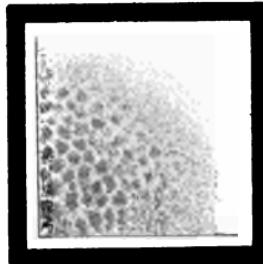
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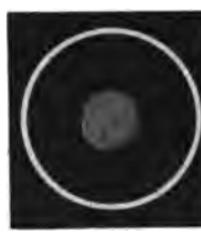
IV.



VI.



VII.



V.



VIII.



IX.





Tab. 19.

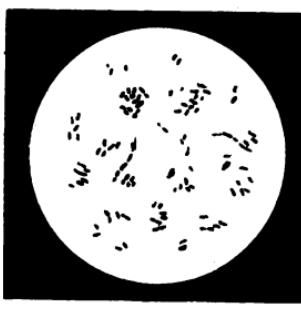
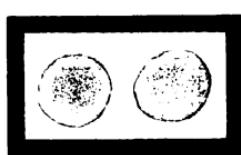
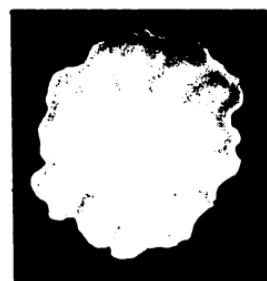
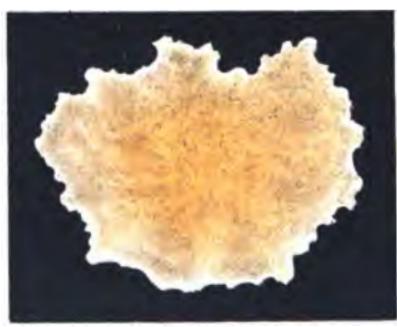


PLATE 19.

**Bacterium coli** (Escherich). L. and N.

I. *Gelatin plate*, eight days at 22°.  $\times 60$ . Cultivated from pus. Deep colonies of abnormal form.

II. *Gelatin plate*, four days at 22°. Natural size.

III. *Gelatin plate*, one day at 22°.  $\times 90$ . Superficial colony. Compare also Plate 14, VIII; Plate 16, VIII.

IV. *Gelatin plate*, four days at 22°.  $\times 60$ . Superficial colony. Compare also Plate 16, IX; Plate 17, I, II.

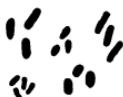
V. *Gelatin plate*, four days at 22°.  $\times 60$ . Deep colonies.

VI. *Gelatin plate*, ten days at 22°.  $\times 90$ . Superficial colony.

VII. *Gelatin plate*, ten days at 22°.  $\times 90$ . Superficial colony.

VIII. *Microscopic preparation*. Pure culture from agar plate.  $\times 500$ .

IX. *Different varieties of coli bacteria*.  $\times 1000$ . Variable sizes.



IX.

PLATE 20.

**Bacterium latericum.** Adametz.

- I. *Agar streak culture*, seven days at 22°.
- II. *Gelatin stab culture*, fourteen days at 22°.
- III. *Gelatin plate*, seven days at 22°. × 60. To the right deep, to the left superficial colonies.
- IV. *Potato culture*, thirty days at 22°. Natural size.
- V. *Agar plate*, seven days at 22°. × 60. To the right a superficial, to the left a deep colony.
- VI. *Microscopic preparation*. Pure culture on agar, twenty-four hours old. × about 800.

**Bacterium hæmorrhagicum** (Kolb). L. and N.  
(*Morbus Werlhofii.*)

- VII. *Microscopic preparation*. Pure culture from bouillon, three days old. (Copied after Kolb, A. G., Bd. VII, Plate II, Figs. 1 and 2.)
- VIII. *Smear preparation from the liver of a dog*. (Copied after Kolb, l. c., Bd. VII, Plate III, Fig. 8.)

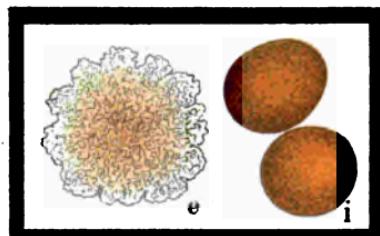
Täb. 20.



I.



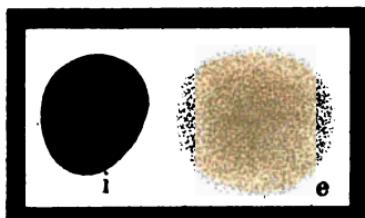
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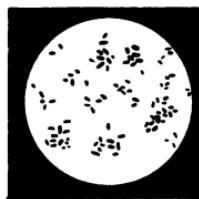
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IV.



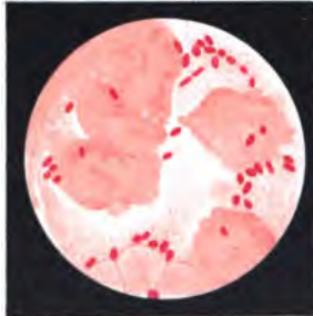
V.



VI.

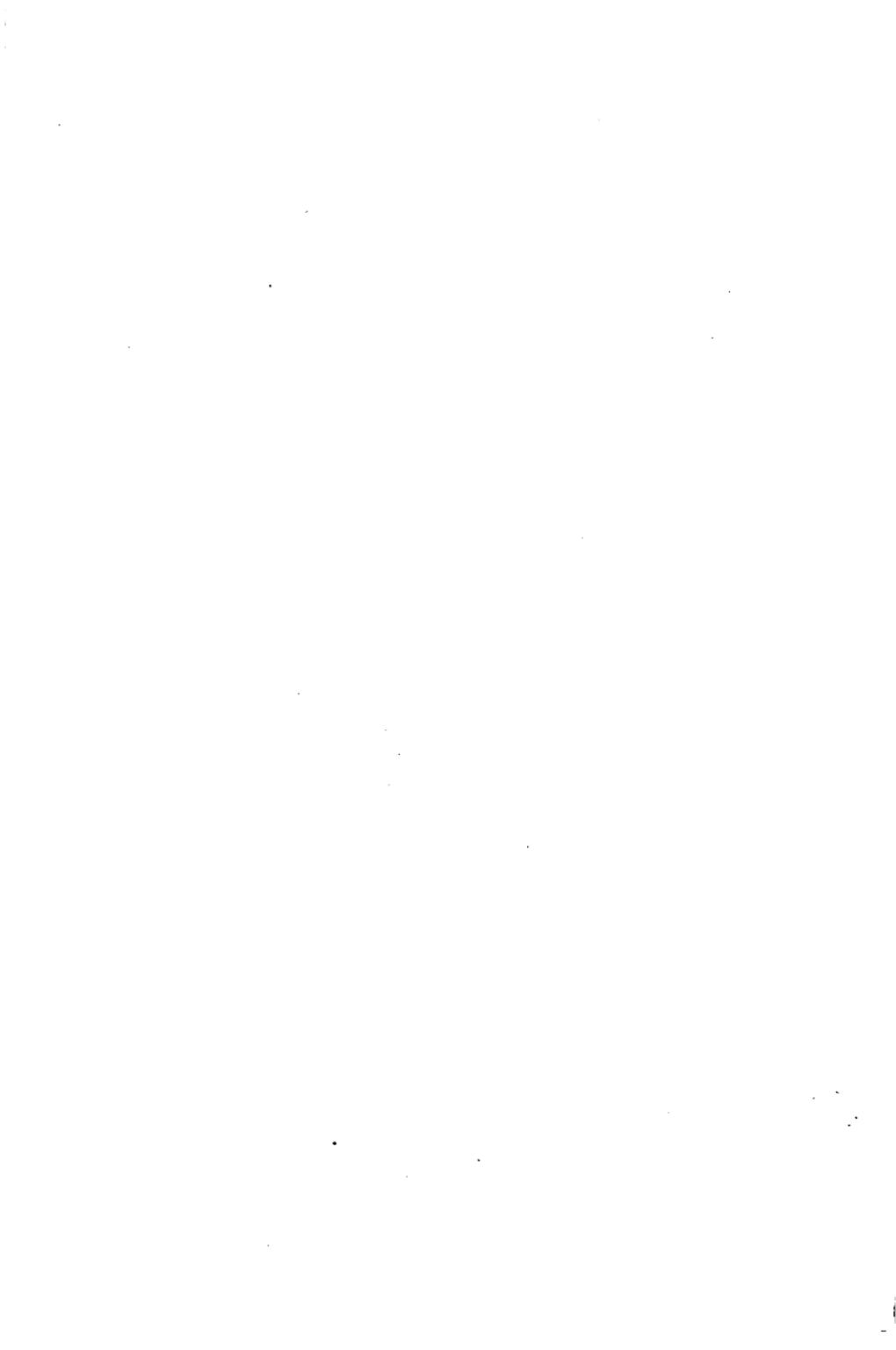


VII.



VIII.





Tab. 21.

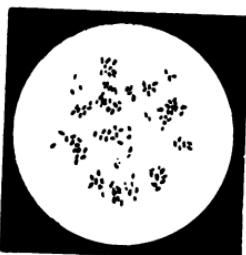
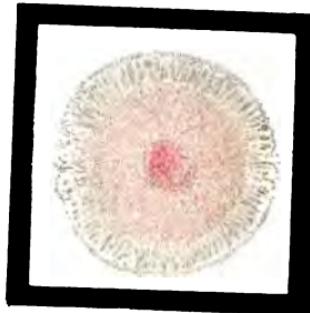
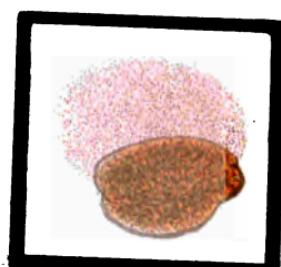


PLATE 21.

**Bacterium prodigiosum** (Ehrenb.). Lehm. and Neum.

- I. *Gelatin stab culture*, one day at 22°.
- II. *Agar streak culture*, four days at 22°.
- III. *Agar stab culture*, four days at 22°. Stab canal.
- IV. *Agar stab culture*, four days at 22°. Surface growth.
- V. *Agar plate*, from two to four days at 22°. Natural size. Colonies with and without color.
- VI. *Agar plate*, eight days at 22°.  $\times$  60. Superficial colony reddish, deep one yellowish.
- VII. *Gelatin plate*, two days at 22°.  $\times$  60. Superficial colony just beginning to sink in.
- VIII. *Gelatin plate*, two days at 22°. Natural size.
- IX. *Potato culture*, eight days at 22°. Typical with metallic luster on the surface.
- X. *Potato culture*, eight days at 22°. Atypical white growth.
- XI. *Microscopic preparation*. Pure culture from agar.  $\times$  800. Stained with fuchsin.
- XII. *Bacteria with several flagella*.  $\times$  1000. Stained according to Löffler.



XII.

PLATE 22.

**Bacterium kiliense** (Breunig and Fischer). L. and N.  
(Kiel Water Bacillus.)

- I. *Agar streak culture*, four days at 22°.
- II. *Gelatin stab culture*, four days at 22°. No formation of pigment.
- III. *Gelatin plate*, five days at 22°. Natural size. Colonies with and without production of pigment.
- IV. *Gelatin plate*, five days at 22°.  $\times 60$ . Superficial colony.
- V. *Gelatin plate*, five days at 22°.  $\times 60$ . Deep colony.
- VI. *Agar plate*, five days at 22°. Natural size. Colored and uncolored, superficial and deep colonies.
- VII. *Agar plate*, five days at 22°.  $\times 60$ . Colorless colonies. To the right, superficial; to the left, deep.
- VIII. *Agar plate*, five days at 22°.  $\times 60$ . Colored colonies. To the right, superficial; to the left, deep.
- IX. *Microscopic preparation*. Pure culture from agar plate.  $\times 1000$ . Stained with fuchsin.
- X. *Potato culture*, five days at 22°.
- XI. *Bacteria with several flagella*.  $\times 1000$ . Stained according to Löffler.



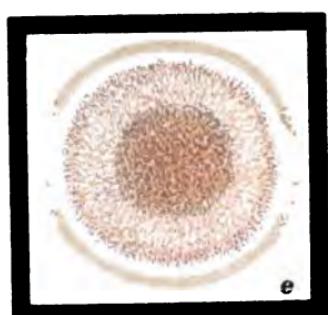
XI.



I.



II.



IV.



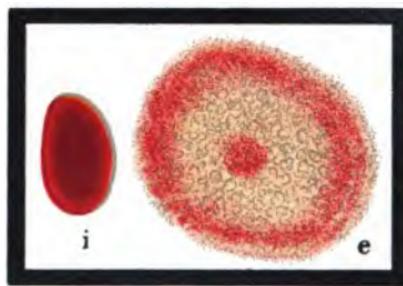
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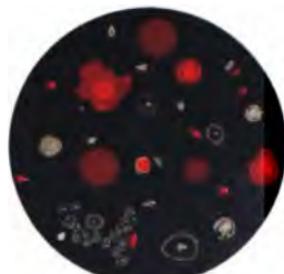
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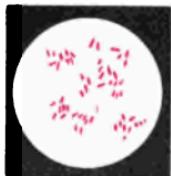
VII.



VIII.



VI.



IX.



X.





Tab. 23.

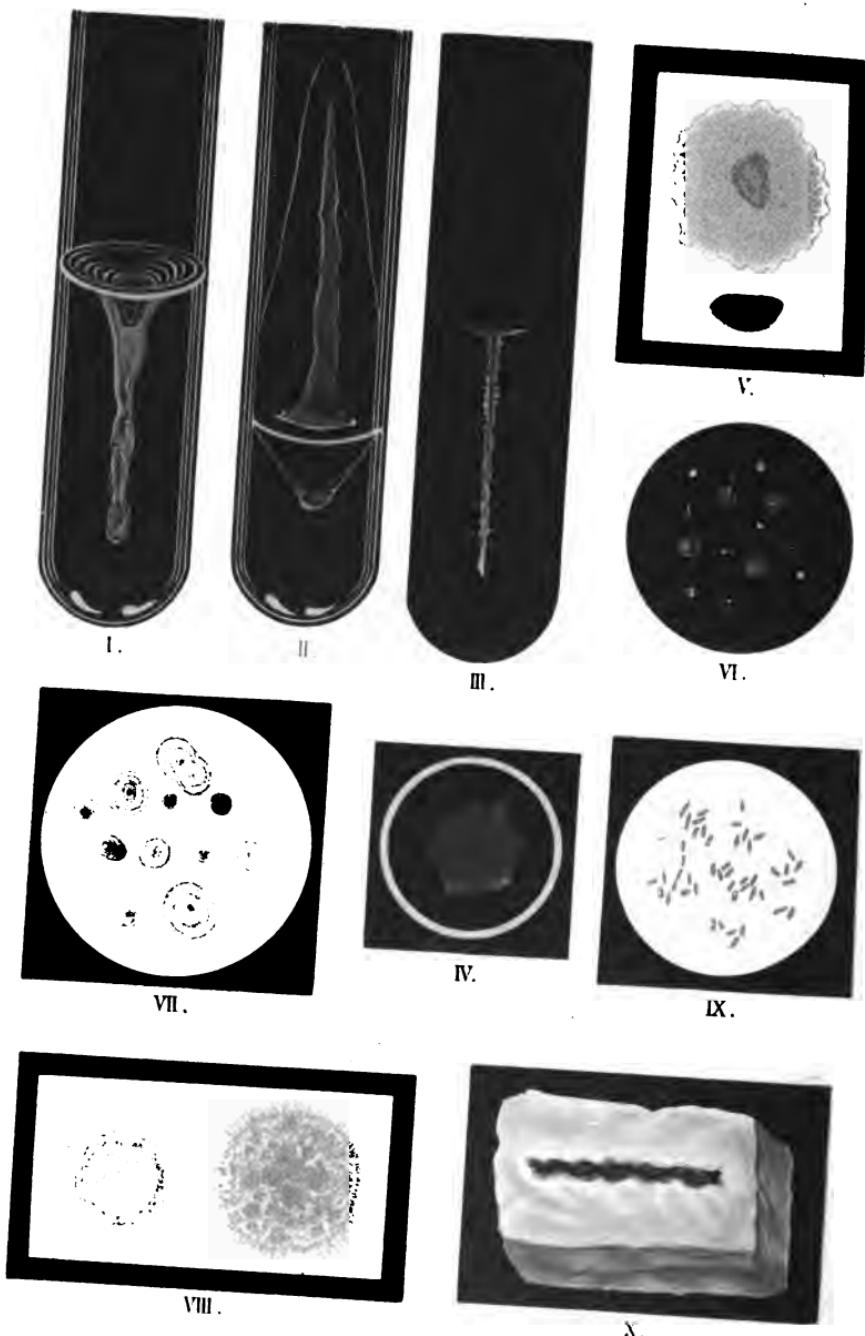


PLATE 23.

**Bacterium violaceum** (J. Schröter). Lehm. and Neum.

I. *Gelatin stab culture*, ten days at ordinary temperature.

II. *Agar streak culture*, six days at ordinary temperature. The white borders after a longer time become likewise violet.

III. *Agar stab culture*, seven days at ordinary temperature. Stab canal.

IV. *Agar stab culture*, seven days at ordinary temperature. Surface growth.

V. *Agar plate culture*, four days at ordinary temperature.  $\times 60$ . Superficial and deep colonies. Within the former is to be seen the original deeply located colony.

VI. *Agar plate culture*, eight days at ordinary temperature. Natural size. The colonies often also become dark violet.

VII. *Gelatin plate culture*. Natural size. Six days at ordinary temperature. The blue zones are not always so intensely colored.

VIII. *Gelatin plate culture*, six days at ordinary temperature.  $\times 60$ . The smaller colony lies near the surface, the larger is on the surface.

IX. *Microscopic preparation*.  $\times 700$ . From a five-days'-old agar culture.

X. *Potato culture*, six days at ordinary temperature.

XI. *Bacteria with flagella*.  $\times 1000$ . Stained according to Löffler.

XII. *Bacteria with flagella*.  $\times 1000$ . From a culture from Sweden.



XI.



XII.

PLATE 24.

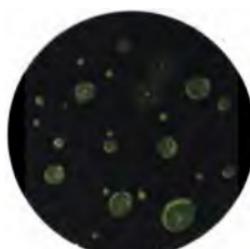
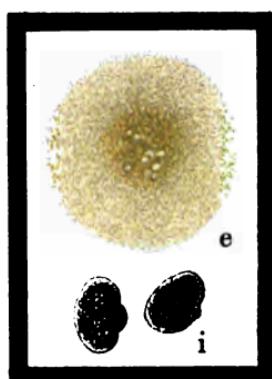
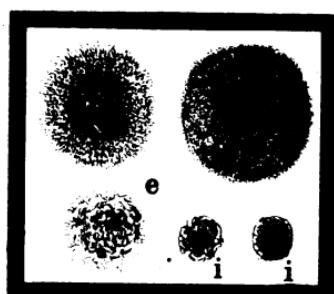
**Bacterium pyocyaneum** (Flügge). Lehm. and Neum.  
(Green Pus.)

- I. *Gelatin stab culture*, three days at 22°.
- II. *Agar streak culture*, two days at 37°.
- III. *Gelatin plate*, two days at 22°.  $\times$  60. Colonies located deeply and just below the surface, in young and older stages.
- IV. *Gelatin plate*, five days at 22°.  $\times$  60. Part of a superficial colony.
- V. *Gelatin plate*, two days at 22°. Natural size.
- VI. *Agar plate*, two days at 37°. Natural size.
- VII. *Agar plate*, two days at 37°.  $\times$  60. Above, superficial; below, deep colonies.
- VIII. *Potato culture*, three days at 37°. Natural size.
- IX. *Microscopic preparation*. Pure culture from agar plate.  $\times$  800.
- X. *Bacteria with one, more rarely two polar flagella*.  $\times$  1000. Stained according to Löffler.



X.

Tab. 24.







Tab. 25.

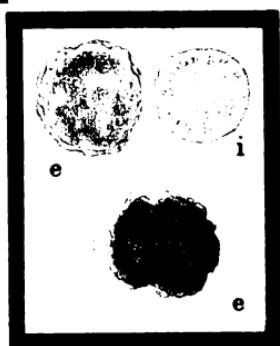
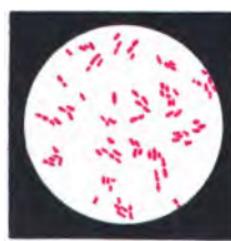
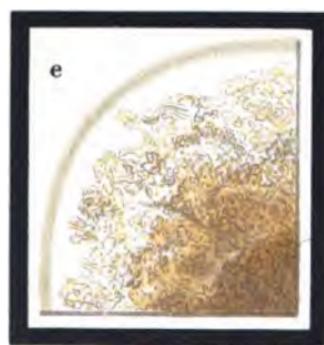


PLATE 25.

**Bacterium fluorescens.** Lehm. and Neum. (*Bacillus fluorescens liquefaciens.* Flügge.)

- I. *Gelatin stab culture*, two days at 22°.
- II. *Gelatin stab culture*, eight days at 22°.
- III. *Agar streak culture*, three days at 22°.
- IV. *Agar stab culture*, four days at 22°.
- V. *Gelatin plate*, two days at 22°.  $\times 90$ . Part of a superficial colony.
- VI. *Agar plate*, twenty-four hours at 22°.  $\times 60$ . (e) Superficial, (i) deep colonies.
- VII. *Gelatin plate*, three days at 22°. Natural size.
- VIII. *Microscopic preparation*. Pure culture from agar plate.  $\times 800$ .
- IX. *Potato culture*, four days at 22°. Natural size.  
Compare also Plate 18, ix; Plate 26, v.
- X. *Bacteria with flagella*, usually one, more rarely two or more.  $\times 1000$ . Stained according to Löffler.



X.

PLATE 26.

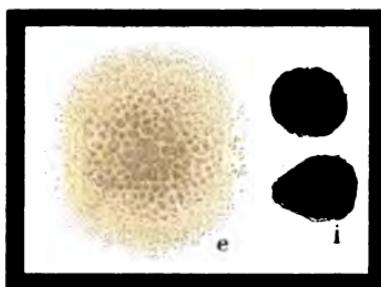
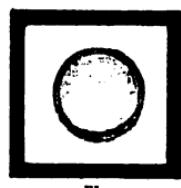
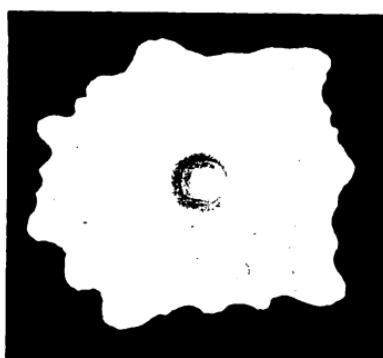
**Bacterium putidum** (Flügge). Lehm. and Neum. **Bacterium fluorescens putidum** Flügge. (**Bacterium fluorescens non-liquefaciens** Autor.)

- I. *Gelatin stab culture*, three days at 22°.
- II. *Gelatin plate*, twenty-four hours at 22°.  $\times$  90.  
Superficial colony. Compare Plate 14, VIII; Plate 19, III.
- III. *Gelatin plate*, twenty-four hours at 22°.  $\times$  90.  
Deep colony.
- IV. *Gelatin plate*, four days at 22°. Natural size. Appearance of colonies upon a dark background.
- V. *Potato culture*, four days at 22°. Natural size.  
Compare also Plate 18, IX.
- VI. *Microscopic preparation*. Pure culture from gelatin plate.  $\times$  800. Upon agar, threads are usually produced.
- VII. *Agar plate*, eight days at 22°. Natural size. Appearance of the colonies upon a white background.
- VIII. *Agar plate*, three days at 22°.  $\times$  60. (e) Superficial, (i) deep colonies.
- IX. *Bacteria with one, more rarely two flagella*.  $\times$  1000. Stained according to Löffler.



IX.

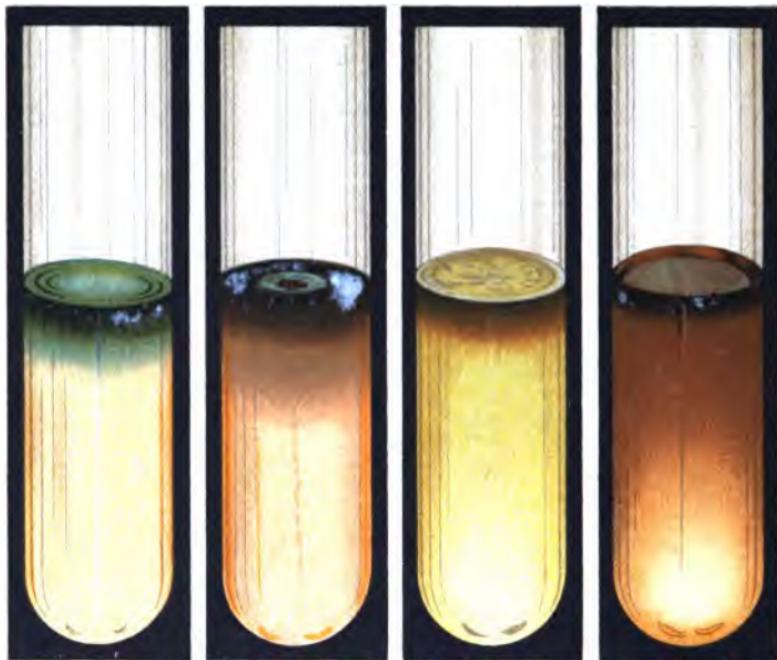
Tab. 26.







Tab. 27.



I.

II.

III.

IV.



V.



VI.



VII.



VIII.

PLATE 27.

**Bacterium syncyaneum** (Ehrenb.). Lehm. and Neum.  
(Bac. cyanogenes Flügge; Blue Milk.)

I-III. *Gelatin stab cultures*, from six to ten days at 22°.  
There occur still other shades of color.

IV. *Agar stab culture*, ten days at 37°.

V. *Bouillon culture*, four days at 37°.

VI. *Milk culture*, three days at 37°. Inoculated upon  
unsterilized milk.

VII. *Microscopic preparation*. Pure culture from agar  
plate. × 800.

VIII. *Microscopic preparation*. Pure culture. Flagella  
staining with Löffler's mordant. × 800.

IX. *Bacteria with flagella*, one or more at one pole.  
× 1000. Stained according to Löffler.



IX.

PLATE 28.

**Bacterium syncyaneum** (Ehrenb.). Lehm. and Neum.  
(Bac. cyanogenes Flügge; Blue Milk.)

I-III. *Potato cultures*, from three to ten days at 22°.  
Many varieties of potato inoculated with the same culture.  
The differences in colors may be still more numerous.

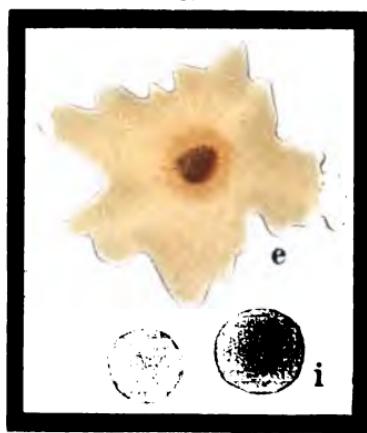
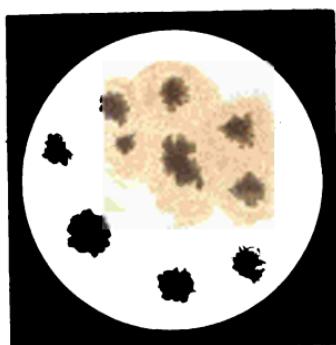
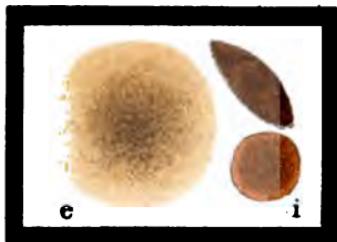
IV. *Agar plate*, three days at 22°. Natural size.

V. *Agar plate*, three days at 22°.  $\times 60$ . To the right,  
deep; to the left, superficial colonies.

VI. *Gelatin plate*, three days at 22°. Natural size.

VII. *Gelatin plate*, eight days at 22°. Natural size.  
Appearance of colonies upon a white background.

VIII. *Gelatin plate*, three days at 22°.  $\times 60$ . Above,  
superficial; below, deep colonies.







Tab. 29.

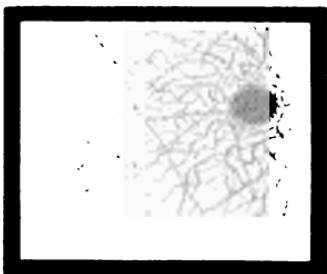


PLATE 29.

**Bacterium Zopfii. Kurth.**

- I. *Gelatin stab culture*, six days at 22°.
- II. *Agar streak culture*, thirty-six hours at 37°. It is actually a grayish color and transparent.
- III. *Agar stab culture*, six days at 22°. Stab.
- IV. *Agar stab culture*, six days at 22°. Surface growth.
- V. *Gelatin plate*, seven days at 22°. Natural size.
- VI. *Gelatin plate*, thirty-six hours at 22°. Natural size.
- VII. *Gelatin plate*, twenty-four hours at 22°. × 90.  
Thread-like portion of the deep colony.
- VIII. *Gelatin plate*, twenty-four hours at 22°. × 60.  
Superficial colony. Compare Plate 31, VII; Plate 32, VIII.

PLATE 30.  
**Bacterium Zopfii.** Kurth.

I. *Gelatin plate*, eight days at 22°.  $\times 90$ . Peripheral portion of a colony.

II. *Microscopic preparation*.  $\times 1000$ . Pure culture, from agar plate, stained with fuchsin.

III. *Agar plate*, four days at 22°. Deep colony.

IV. *Agar plate*, twenty-four hours at 37°. Natural size.

V. *Agar plate*, twelve hours at 37°. Deep and superficial colony.

VI. *Agar plate*, twenty-four hours at 37°.  $\times 60$ . Superficial colony, surrounded by innumerable bacteria swarming outward.

VII. *Gelatin plate*, eight days at 22°. Sausage-shaped forms of the deep colony.

IX. *Bacteria with numerous flagella*.  $\times 1000$ . Stained according to Löffler.



IX.

Tab. 30.

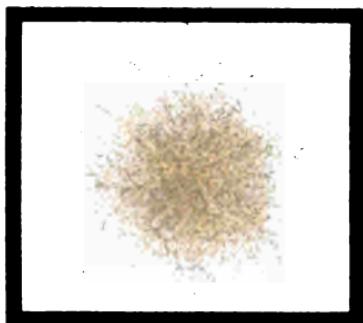


PLATE 30.  
**Bacterium Zopfii.** Kurth.

I. *Gelatin plate*, eight days at 22°.  $\times 90$ . Peripheral portion of a colony.

II. *Microscopic preparation*.  $\times 1000$ . Pure culture, from agar plate, stained with fuchsin.

III. *Agar plate*, four days at 22°. Deep colony.

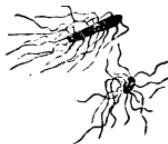
IV. *Agar plate*, twenty-four hours at 37°. Natural size.

V. *Agar plate*, twelve hours at 37°. Deep and superficial colony.

VI. *Agar plate*, twenty-four hours at 37°.  $\times 60$ . Superficial colony, surrounded by innumerable bacteria swarming outward.

VII. *Gelatin plate*, eight days at 22°. Sausage-shaped forms of the deep colony.

IX. *Bacteria with numerous flagella*.  $\times 1000$ . Stained according to Löffler.

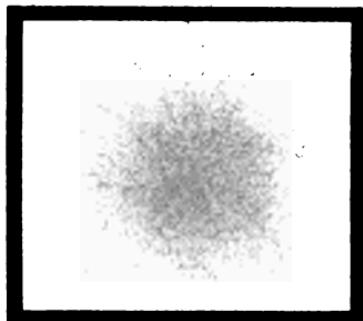


IX.

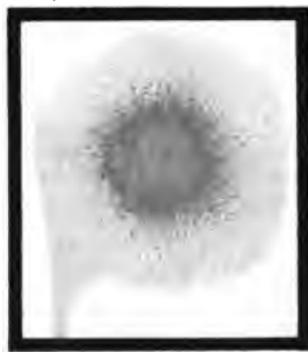
Tab. 30.



I.



VI.



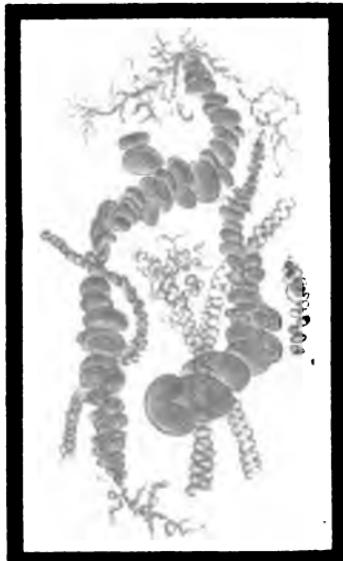
III.



IV.



V.



VII.



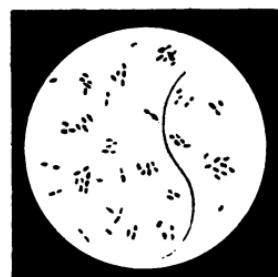
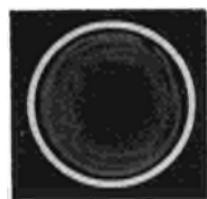


PLATE 32.

**Bacterium vulgare  $\beta$  mirabilis** (Hauser). L. and N.  
(*Proteus mirabilis* Hauser.)

- I. *Agar stab culture*, two days at 22°. Stab canal.
- II. *Agar stab culture*, two days at 22°. Surface growth.
- III. *Gelatin stab culture*; six days at 22°.
- IV. *Agar streak culture*, two days at 22°.
- V. *Agar plate*, seven days at 22°. Natural size.
- VI. *Agar plate*, seven days at 22°.  $\times$  60. Above, superficial; below, deep colony.
- VII. *Gelatin plate*, two days at 22°.  $\times$  60. Deep colonies.
- VIII. *Gelatin plate*, two days at 22°.  $\times$  60. Superficial colony.
- IX. *Potato culture*, eight days at 22°. Natural size.
- X. *Microscopic preparation*. Pure culture on agar two days old.  $\times$  800.

Tab. 32.







Tab. 33.

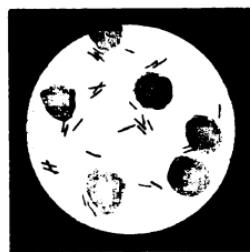
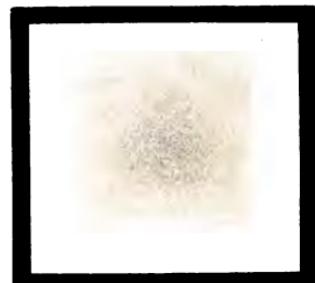
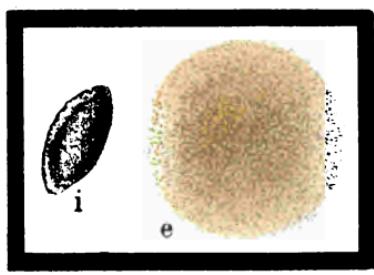


PLATE 33.

**Bacterium erysipelatos suum.** Migula.

(Swine Erysipelas.)

I. *Gelatin stab culture*, five days at 22°.

**Bacterium murisepticum.** Migula. (Mouse Septicemia.)

II. *Agar streak culture*, four days at 22°.

III. *Gelatin stab culture*, four days at 22°.

IV. *Agar stab culture*, four days at 22°. Surface growth.

V. *Gelatin plate*, four days at 22°. Natural size.

VI. *Gelatin plate*, four days at 22°.  $\times 60$ . Superficial colony.

VII. *Agar plate*, four days at 22°.  $\times 60$ . To the right, superficial; to the left, deep colony.

VIII. *Microscopic preparation*. Pure culture on agar two days old.  $\times 800$ .

IX. *Microscopic preparation*. Smear preparation from the blood of a mouse's spleen.  $\times 800$ .

PLATE 34.

**Bacillus anthracis.** F. Cohn and R. Koch.  
(Splenic Fever.)

I-V. *Gelatin stab cultures*, three days at 22°. Figures I and II are typical; the others, atypical.

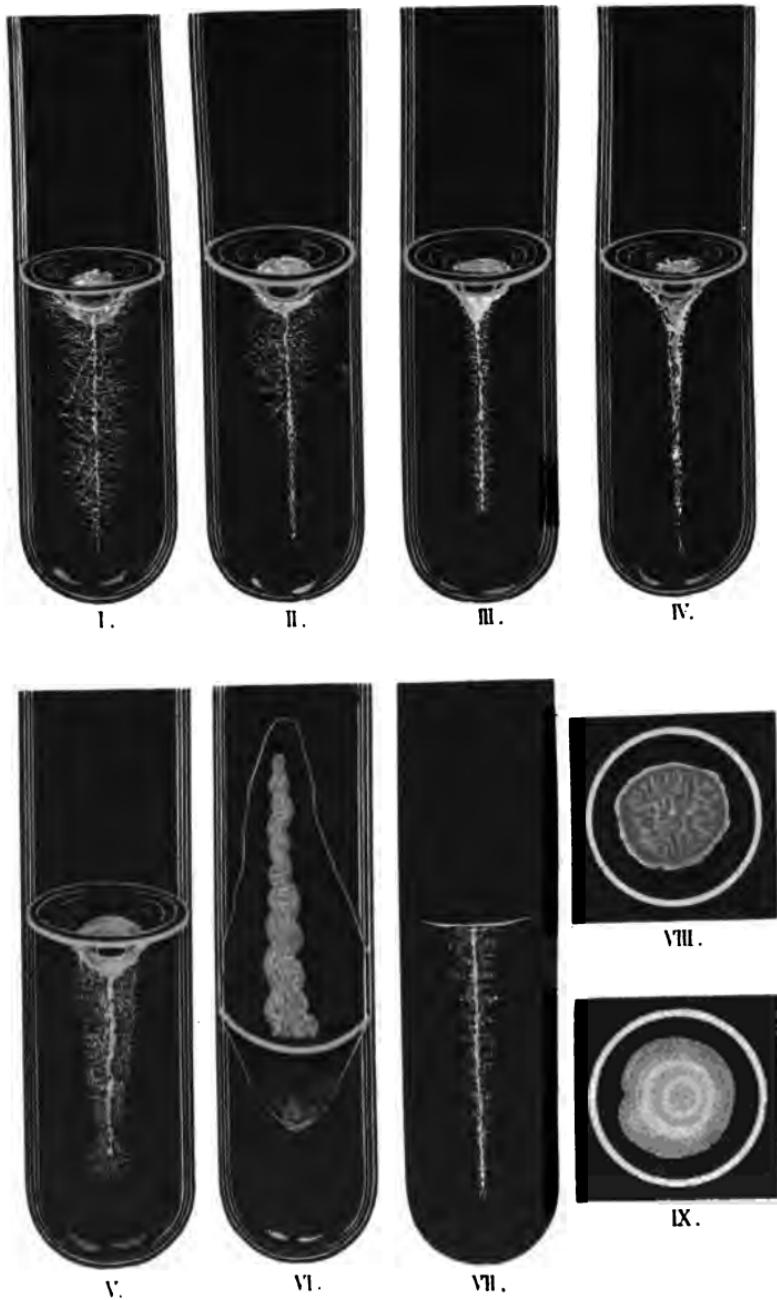
VI. *Agar streak culture*, two days at 22°.

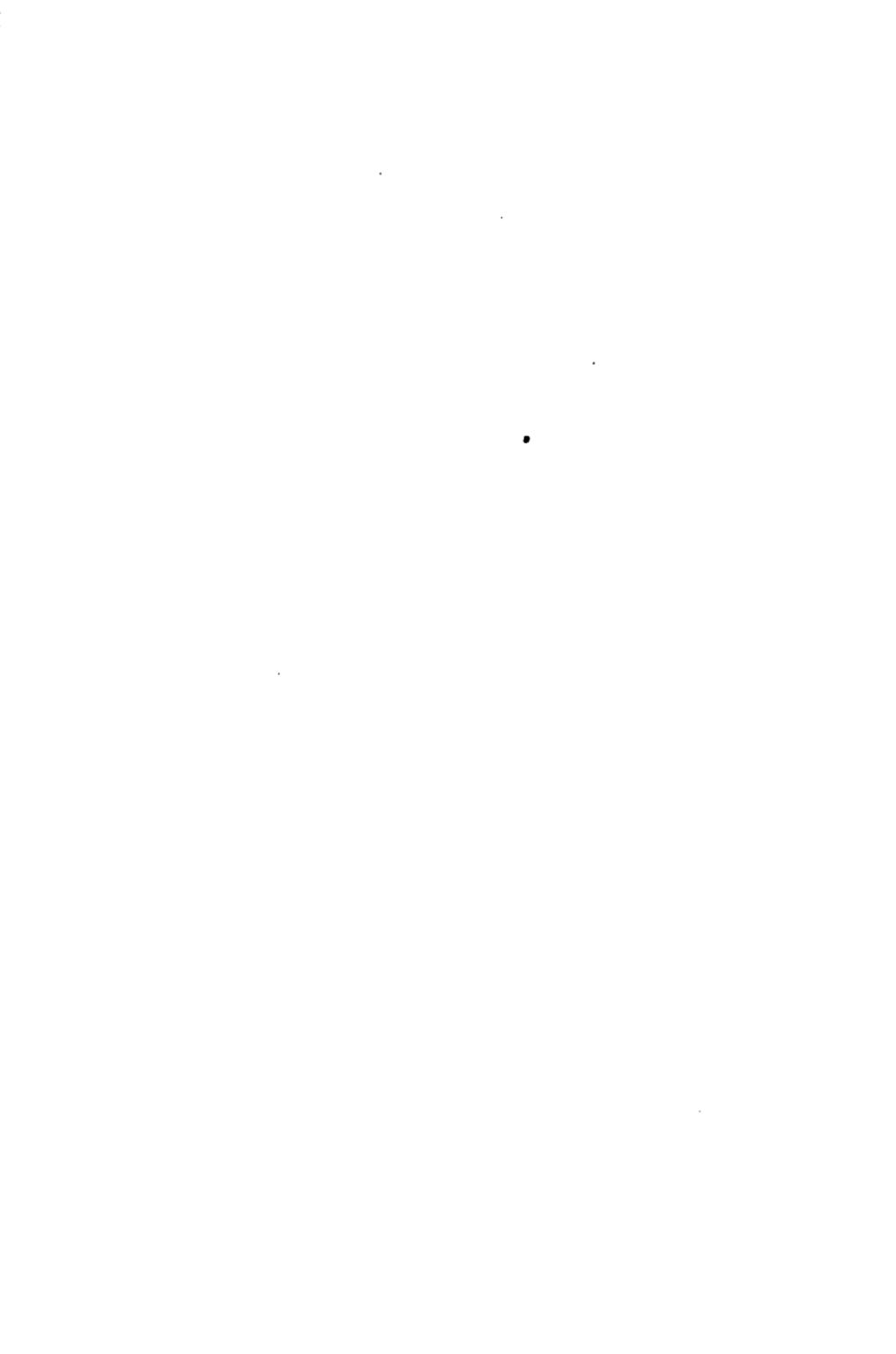
VII. *Agar stab culture*, five days at 22°. Stab canal.

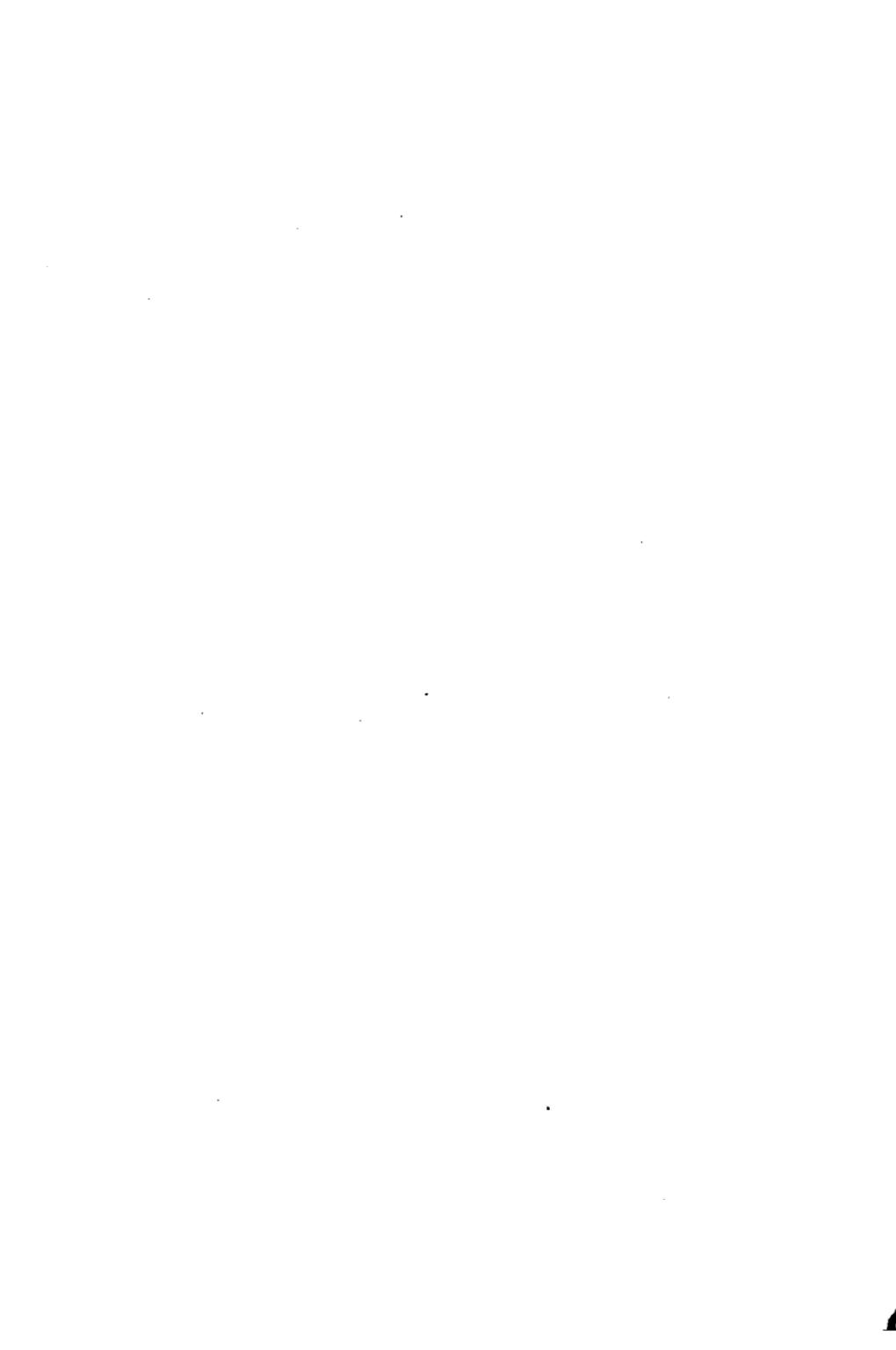
VIII. *Agar stab culture*, five days at 22°. Surface growth, which is atypical.

IX. *Agar stab culture*, five days at 22°. Surface growth typical; often also is homogeneous whitish-gray.

Tab. 34.







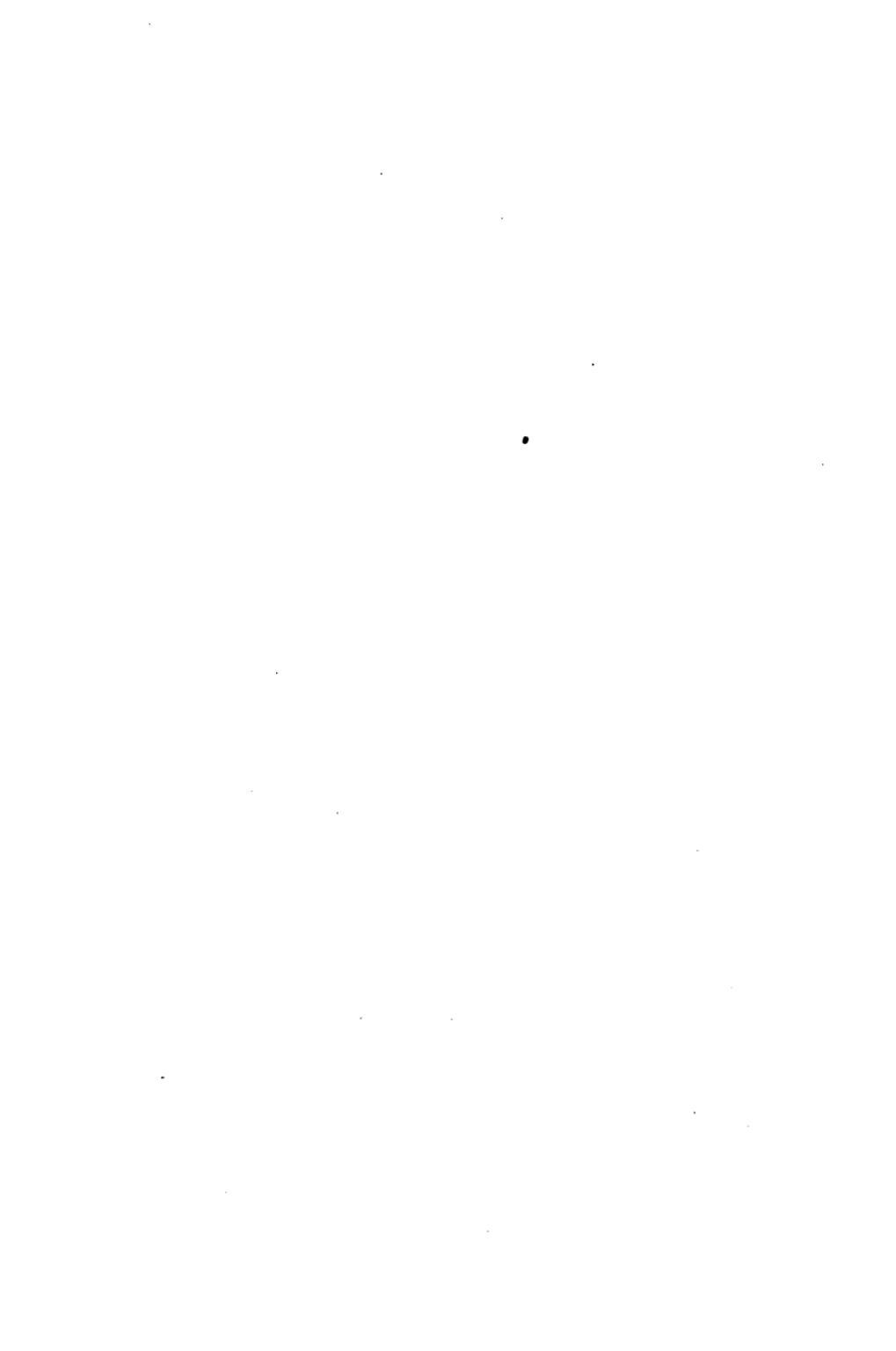




PLATE 36.

**Bacillus anthracis.** F. Cohn and R. Koch.  
(Splenic Fever.)

- I. *Smear preparation from the blood of the spleen of a mouse.*  $\times 1000$ .
- II. *Contact preparation of an agar plate culture*, one day at  $22^\circ$ .  $\times 1000$ .
- III. *Unstained preparation in hanging drop from a bouillon culture*, thirty-six hours at  $37^\circ$ .  $\times 1000$ . Spores begin already to escape.
- IV. *Anthrax threads from agar*, thirty-six hours at  $37^\circ$ .  $\times 1000$ . Stained with Ziehl's solution; spores red, bacilli blue.
- V. *Involution forms*. Five-weeks'-old agar stab culture, stained with fuchsin.  $\times 1000$ .
- VI. *Unstained preparation in hanging drop from a bouillon culture*, eight hours at  $37^\circ$ .  $\times 1000$ . Beginning of spore-formation.

**Tab. 36.**



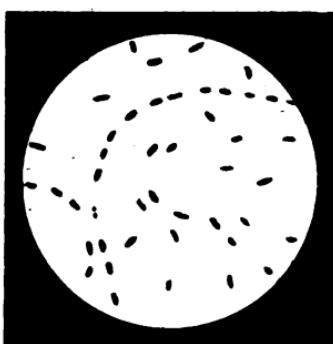
I.



II.



III.



IV.



V.



VI.





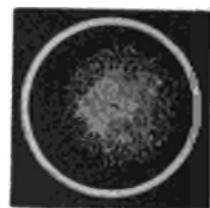
Tab. 37.



VI.



VII.



V.



IX.



VIII.

PLATE 37.

**Bacillus mycoides.** Flügge. (Root Bacillus.)

- I. *Gelatin stab culture*, four days at 22°.
- II. *Gelatin stab culture*, fourteen days at 22°.
- III. *Agar streak culture*, two days at 22°.
- IV. *Agar stab culture*, eight days at 22°. Stab canal.
- V. *Agar stab culture*, eight days at 22°. Surface growth.
- VI. *Gelatin plate*, one day at 22°. Natural size.
- VII. *Agar plate*, one day at 22°. Natural size.
- VIII. *Agar plate*, four days at 22°. Natural size.
- IX. *Gelatin plate*, four days at 22°. Natural size. The colony is at the point of sinking in.

PLATE 38.

**Bacillus mycoides.** Flügge. (Root Bacillus.)

I. *Agar plate*, one day at 22°.  $\times 20$ . Superficial and deep colony.

II. *Potato culture*, seven days at 22°. Natural size.

III. *Microscopic preparation*. Pure culture, twenty-four hours old, on agar.  $\times 1000$ . Stained with fuchsin. A few bacilli contain spores.

IV. *Agar plate*, one day at 22°.  $\times 100$ . Part of a superficial colony.

**Bacillus butyricus.** Hüppe. (Butyric Acid Bacillus.)

V. *Potato culture*, three days at 22°.

VI. *Gelatin plate*, one day at 22°.  $\times 60$ . Above, superficial; below, deep colonies.

VII. *Gelatin plate*, thirty-six hours at 22°.  $\times 60$ . Part of a superficial colony.

VII A. Flagella preparation.  $\times 1000$ . Stained according to Löffler.



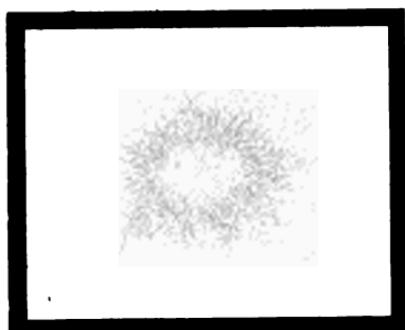
VII A.

**Bacillus vulgatus.** Migula. (*B. mesentericus vulgatus* Flügge. Potato Bacillus.)

VIII. *Potato culture*, five days at 22°.

IX. *Potato culture*, five days at 22°. Natural size. Both forms of growth occur.

Tab. 38.

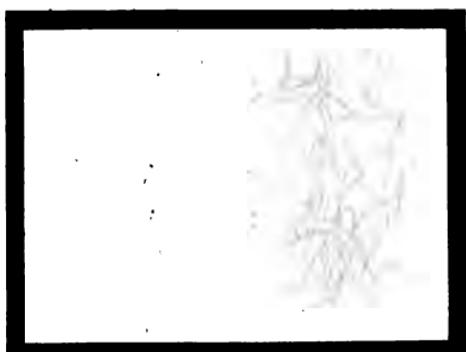


II.

I.



III.



IV.



V.



VI.



VII.



VIII.



IX.





Tab. 39.



I.



II.



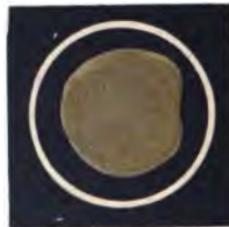
III.



IV.



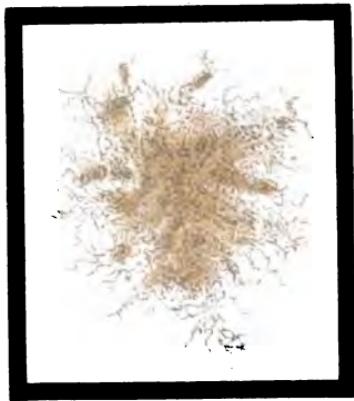
VI.



V.



VIII.



VII.

PLATE 39.

**Bacillus subtilis** (Ehrenberg). F. Cohn.  
(*Hay Bacillus.*)

- I. *Gelatin stab culture*, thirty-six hours at 22°.
- II. *Gelatin stab culture*, eight days at 22°.
- III. *Agar streak culture*, two days at 37°.
- IV. *Agar stab culture*, two days at 37°. Stab canal.
- V. *Agar stab culture*, two days at 37°. Surface growth.
- VI. *Agar plate*, twelve hours at 37°.  $\times$  60. Superficial colony.
- VII. *Agar plate*, twelve hours at 37°.  $\times$  60. Deep colony.
- VIII. *Agar plate*, twelve hours at 37°. Natural size.

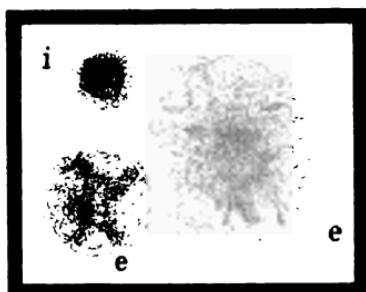
PLATE 40.

**Bacillus subtilis** (Ehrenberg). F. Cohn.  
(*Hay Bacillus.*)

- I. *Potato culture*, seven days at 22°.
- II. *Gelatin plate*, two days at 22°.  $\times$  60. Above and to the left, a deep colony; below this, one lying directly at the surface; to the right, a superficial colony.
- III. *Gelatin plate*, two days at 22°. Natural size.
- IV. *Gelatin plate*, two days at 22°.  $\times$  10.
- V. *Microscopic preparation*.  $\times$  1000. From an agar culture three hours old at 37°, stained with fuchsin.
- VI. *Microscopic preparation*. Bacilli with flagella, after Fischer. Very highly magnified.
- VII. *Microscopic preparation*.  $\times$  1000. From an agar culture, ten days at 22°. Contains spores. Unstained.
- VIII. *Microscopic preparation*.  $\times$  700. From an agar culture, ten days at 22°. Double stain with carbol-fuchsin and methylene-blue.
- IX. Bacilli with numerous flagella.  $\times$  1000. Stained according to Löffler.



IX.



II.



III.



I.



IV.



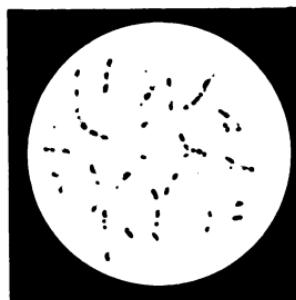
V.



VI.



VII.



VIII.





PLATE 42.

**Bacillus vulgatus.** Migula. (*B. mesentericus vulgatus*  
Flügge. Potato Bacillus.)

- I. *Gelatin stab culture*, ten days at 22°.
- II. *Agar streak culture*, ten days at 22°.
- III. *Agar stab culture*, six days at 22°. Surface growth.
- IV. *Agar plate*, six days at 22°. Natural size.
- V. *Agar plate*, six days at 22°.  $\times 60$ . Deep colonies.
- VI. *Agar plate*, six days at 22°.  $\times 60$ . Superficial colony.
- VII. *Gelatin plate*, eight days at 22°. Natural size.
- VIII. *Gelatin plate*, eight days at 22°.  $\times 60$ . Part of a superficial colony.
- IX. *Gelatin plate*, eight days at 22°.  $\times 150$ . Part of a superficial colony.
- X. *Potato culture*, five days at 22°. Natural size.
- XI. *Microscopic preparation*. Pure culture from agar, one day old.  $\times 800$ . Stained with fuchsin.
- XII. *Bacilli with numerous flagella*.  $\times 1000$ . Stained according to Löffler.



XII.



I.



II.



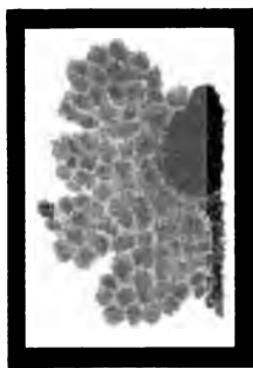
VI.



IV.



V.



VIII.



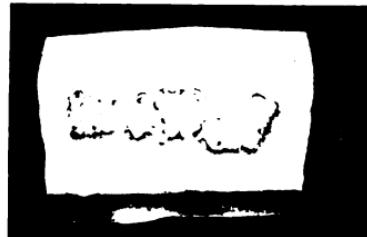
III.



IX.



XI.



X.





Tab. 43.

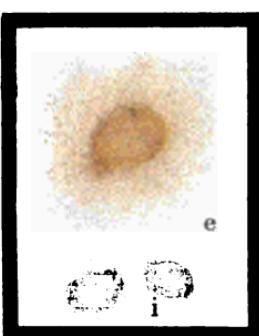
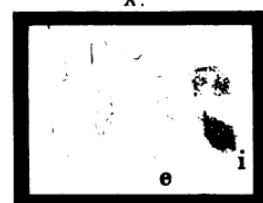
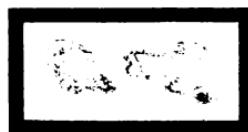


PLATE 43.

**Bacillus mesentericus.** Lehm. and Neum. (*B. mesentericus fuscus Flügge.*)

- I. *Gelatin stab culture*, two days at 22°.
- II. *Agar streak culture*, three days at 22°.
- III. *Potato culture*, one day at 22°. Natural size.
- IV. *Potato culture*, five days at 22°. Natural size.
- V. *Agar plate*, two days at 22°. Natural size.
- VI. *Agar stab culture*, four days at 22°. Surface growth.
- VII. *Agar plate*, two days at 22°.  $\times 60$ . Above, superficial; below, deep colonies.
- VIII. *Gelatin plate*, thirty-six hours at 22°.  $\times 60$ . Deep colonies.
- IX. *Gelatin plate*, thirty-six hours at 22°.  $\times 60$ . Superficial colony.
- X. *Gelatin plate*, two days at 22°. Natural size.
- XI. *Gelatin plate*, one day at 22°.  $\times 60$ . To the right, deep; to the left, superficial colonies.
- XII. *Microscopic preparation*.  $\times 800$ . From a pure culture on agar two days old. Stained with fuchsin. Some bacilli contain spores.
- XIII. *Bacilli with numerous flagella*.  $\times 1000$ . Stained by Löffler's method.

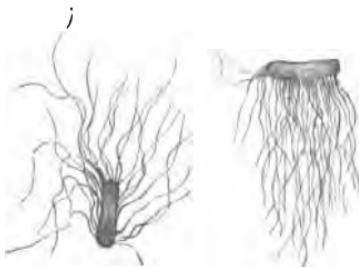


XIII.

PLATE 44.

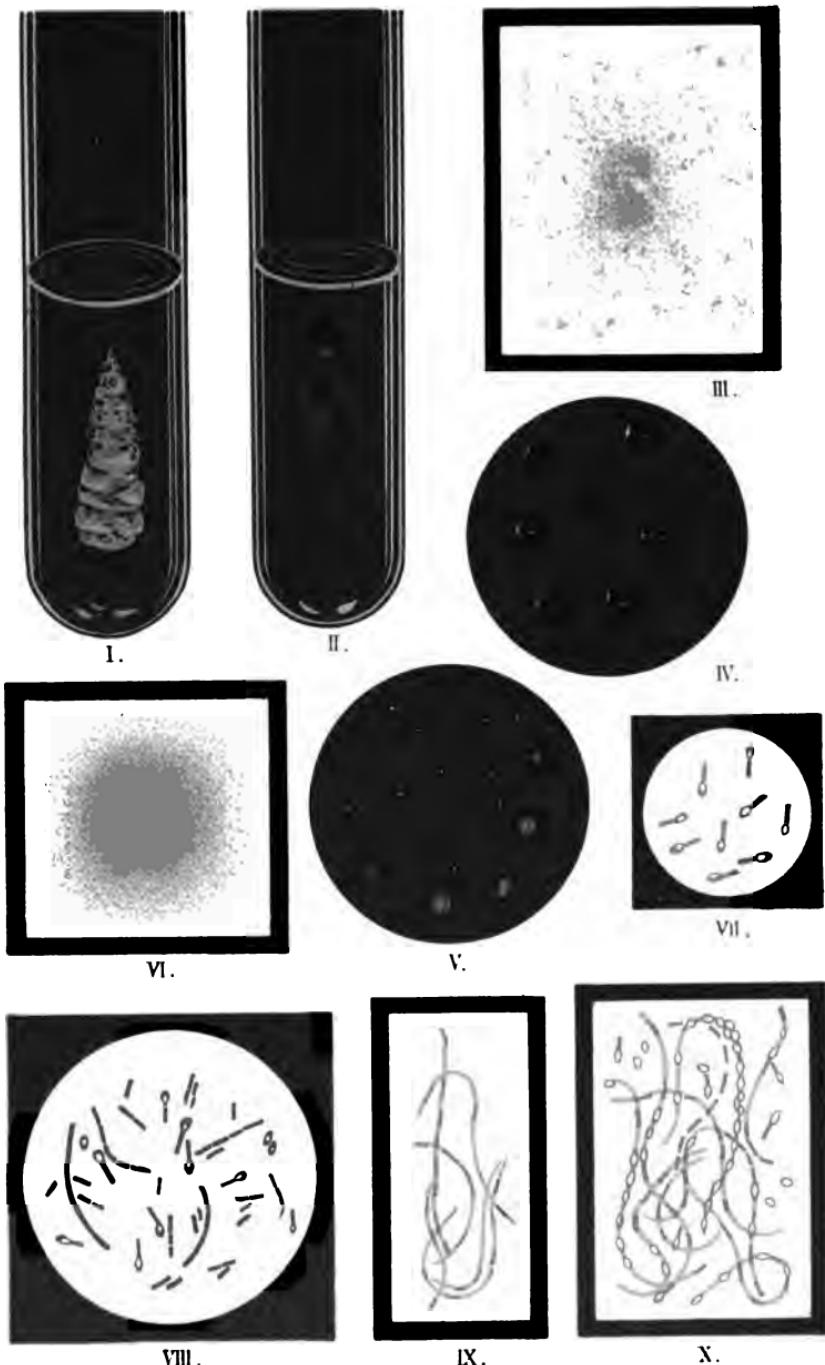
**Bacillus tetani.** Nicolaier. (*Tetanus Bacillus*.)

- I. *Sugar-agar stab culture*, three days at 37°.
- II. *Sugar-gelatin stab culture*, six days at 22°.
- III. *Sugar-gelatin plate*, four days at 22°. Grown without air.
- IV. *Sugar-gelatin plate*, four days at 22°.  $\times 60$ . Natural size. Superficial and deep colonies. Grown without air.
- V. *Sugar-agar plate*, four days at 37°. Natural size. Grown without air.
- VI. *Sugar-agar plate*, four days at 37°.  $\times 60$ . Superficial and deep colonies. Grown without air.
- VII. *Microscopic preparation*. Pure culture on sugar-agar, three days at 37°.  $\times 1000$ . Bacilli with spores. Double staining according to Ziehl.
- VIII. *Microscopic preparation*. Pure culture on sugar-agar, two days at 37°.  $\times 1000$ . Some bacilli contain spores. Stained with fuchsin.
- IX. *Microscopic preparation*. Pure culture on sugar-agar, twenty-four hours at 37°.  $\times 1000$ . Extremely long threads with faintly stained intervals.
- X. *Microscopic preparation*. Pure culture on sugar-agar, six days at 37°.  $\times 1000$ . Stained with fuchsin. Long threads and chains of spores with faintly stained intervals.
- XI. *Microscopic preparation*. Flagella staining. Highly magnified.



XI.

Tab. 44.







Tab. 45.

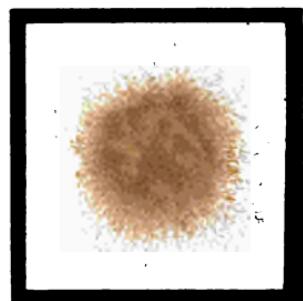


PLATE 45.

**Bacillus Chauvœi.** Macé. (Symptomatic Anthrax.)

- I. *Sugar-gelatin stab culture*, six days at 22°.
- II. *Sugar-agar stab culture*, three days at 37°.
- III. *Sugar-agar stab culture*, three weeks at 37°.
- IV. *Sugar-agar plate*, four days at 37°. Natural size.

Grown as anaerobe.

V. *Sugar-agar plate*, four days at 37°.  $\times$  60. Superficial and deep colony. Grown as anaerobe.

VI. *Sugar-gelatin plate*, four days at 22°. Natural size.  
Grown as anaerobe.

VII. *Sugar-gelatin plate*, four days at 22°.  $\times$  60.  
Deep colony, grown as anaerobe.

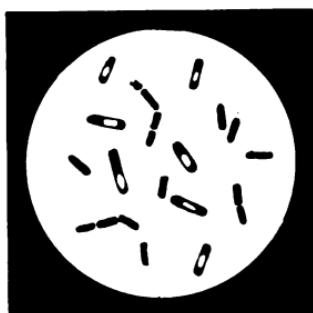
VIII. *Sugar-gelatin plate*, two days at 22°.  $\times$  150.  
Part of a superficial colony. Grown as anaerobe.

IX. *Microscopic preparation*. Pure culture on sugar-agar, three days at 37°.  $\times$  1000. Bacilli with spores and free spores. Stained with fuchsin.

PLATE 46.

**Bacillus œdematis maligni.** Koch. (Malignant Edema.)

- I. *Sugar-agar stab culture*, eight days at 37°.
- II. *Microscopic preparation*. Tuft of flagella.  $\times$  about 1500. Copied from G. Novy ("Zeitschrift f. Hygiene," Bd. xvii, Taf. 1, 2).
- III. *Microscopic preparation*. Bacilli with flagella. Pure culture on agar, twenty-four hours old.  $\times$  1000. Stained according to Löffler.
- IV. *Sugar-agar plate*, four days at 22°.  $\times$  60. Part of a superficial colony.
- V. *Sugar agar plate*, six days at 22°. Natural size.
- VI. *Microscopic preparation*. Pure culture on agar, two days old at 37°. Bacilli with spores.  $\times$  1000. Stained with fuchsin.
- VII. *Microscopic preparation*. Tissue-juice from guinea-pig. Smear preparation. Copied after Fränkel and Pfeiffer (Mikrophotogr. Atlas, Taf. xxiii, 46).



Tab. 43.

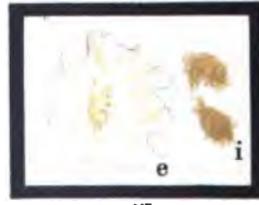
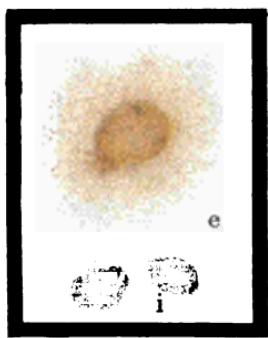
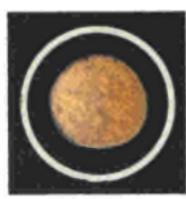
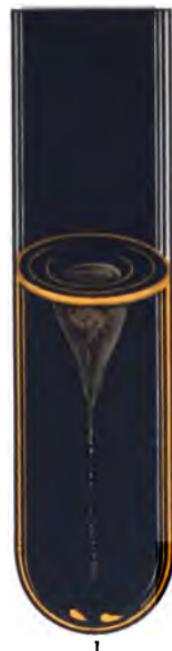


PLATE 43.

**Bacillus mesentericus.** Lehm. and Neum. (*B. mesentericus fuscus* Flügge.)

- I. *Gelatin stab culture*, two days at 22°.
- II. *Agar streak culture*, three days at 22°.
- III. *Potato culture*, one day at 22°. Natural size.
- IV. *Potato culture*, five days at 22°. Natural size.
- V. *Agar plate*, two days at 22°. Natural size.
- VI. *Agar stab culture*, four days at 22°. Surface growth.
- VII. *Agar plate*, two days at 22°.  $\times 60$ . Above, superficial; below, deep colonies.
- VIII. *Gelatin plate*, thirty-six hours at 22°.  $\times 60$ . Deep colonies.
- IX. *Gelatin plate*, thirty-six hours at 22°.  $\times 60$ . Superficial colony.
- X. *Gelatin plate*, two days at 22°. Natural size.
- XI. *Gelatin plate*, one day at 22°.  $\times 60$ . To the right, deep; to the left, superficial colonies.
- XII. *Microscopic preparation*.  $\times 800$ . From a pure culture on agar two days old. Stained with fuchsin. Some bacilli contain spores.
- XIII. *Bacilli with numerous flagella*.  $\times 1000$ . Stained by Löffler's method.

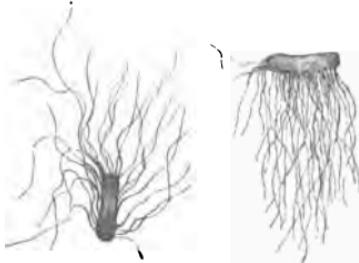


XIII.

PLATE 44.

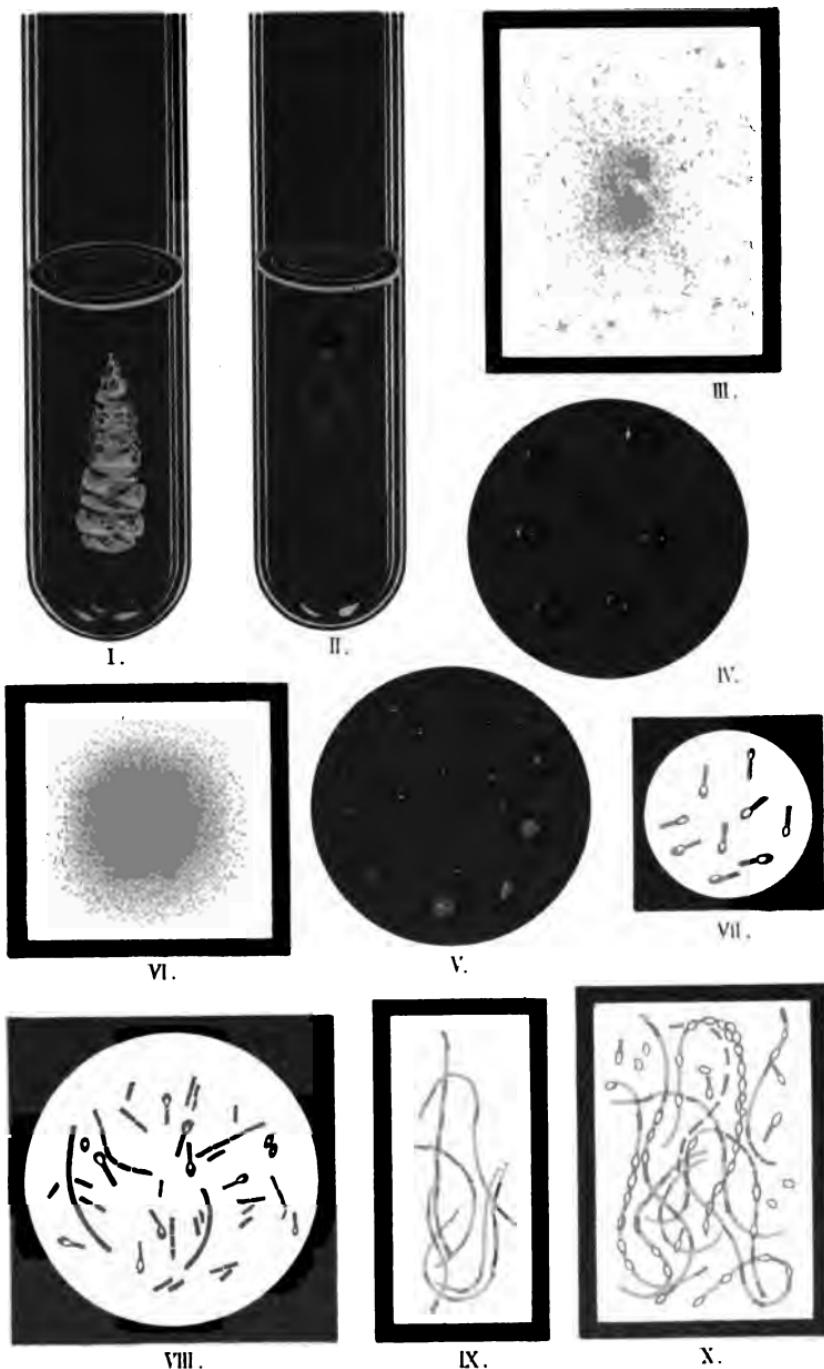
**Bacillus tetani.** Nicolaier. (*Tetanus Bacillus*.)

- I. *Sugar-agar stab culture*, three days at 37°.
- II. *Sugar-gelatin stab culture*, six days at 22°.
- III. *Sugar-gelatin plate*, four days at 22°. Grown without air.
- IV. *Sugar-gelatin plate*, four days at 22°.  $\times 60$ . Natural size. Superficial and deep colonies. Grown without air.
- V. *Sugar-agar plate*, four days at 37°. Natural size. Grown without air.
- VI. *Sugar-agar plate*, four days at 37°.  $\times 60$ . Superficial and deep colonies. Grown without air.
- VII. *Microscopic preparation*. Pure culture on sugar-agar, three days at 37°.  $\times 1000$ . Bacilli with spores. Double staining according to Ziehl.
- VIII. *Microscopic preparation*. Pure culture on sugar-agar, two days at 37°.  $\times 1000$ . Some bacilli contain spores. Stained with fuchsin.
- IX. *Microscopic preparation*. Pure culture on sugar-agar, twenty-four hours at 37°.  $\times 1000$ . Extremely long threads with faintly stained intervals.
- X. *Microscopic preparation*. Pure culture on sugar-agar, six days at 37°.  $\times 1000$ . Stained with fuchsin. Long threads and chains of spores with faintly stained intervals.
- XI. *Microscopic preparation*. Flagella staining. Highly magnified.



XI.

Tab. 44.







Tab. 45.

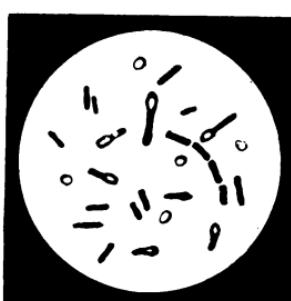
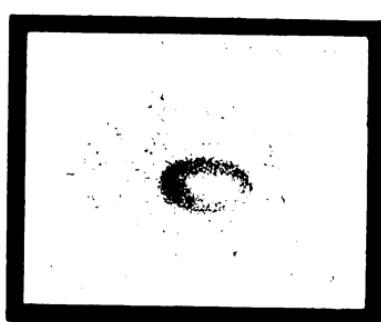
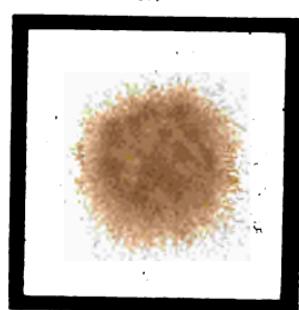


PLATE 45.

**Bacillus Chauvœi.** Macé. (Symptomatic Anthrax.)

- I. *Sugar-gelatin stab culture*, six days at 22°.
- II. *Sugar-agar stab culture*, three days at 37°.
- III. *Sugar-agar stab culture*, three weeks at 37°.
- IV. *Sugar-agar plate*, four days at 37°. Natural size.  
Grown as anaerobe.
- V. *Sugar-agar plate*, four days at 37°.  $\times$  60. Superficial and deep colony. Grown as anaerobe.
- VI. *Sugar-gelatin plate*, four days at 22°. Natural size.  
Grown as anaerobe.
- VII. *Sugar-gelatin plate*, four days at 22°.  $\times$  60.  
Deep colony, grown as anaerobe.
- VIII. *Sugar-gelatin plate*, two days at 22°.  $\times$  150.  
Part of a superficial colony. Grown as anaerobe.
- IX. *Microscopic preparation*. Pure culture on sugar-agar, three days at 37°.  $\times$  1000. Bacilli with spores and free spores. Stained with fuchsin.

PLATE 46.

**Bacillus cedematis maligni.** Koch. (Malignant Edema.)

- I. *Sugar-agar stab culture*, eight days at 37°.
- II. *Microscopic preparation*. Tuft of flagella.  $\times$  about 1500. Copied from G. Novy ("Zeitschrift f. Hygiene," Bd. xvii, Taf. 1, 2).
- III. *Microscopic preparation*. Bacilli with flagella. Pure culture on agar, twenty-four hours old.  $\times$  1000. Stained according to Löffler.
- IV. *Sugar-agar plate*, four days at 22°.  $\times$  60. Part of a superficial colony.
- V. *Sugar agar plate*, six days at 22°. Natural size.
- VI. *Microscopic preparation*. Pure culture on agar, two days old at 37°. Bacilli with spores.  $\times$  1000. Stained with fuchsin.
- VII. *Microscopic preparation*. Tissue-juice from guinea-pig. Smear preparation. Copied after Fränkel and Pfeiffer (Mikrophotogr. Atlas, Taf. xxiii, 46).







Tab. 47.

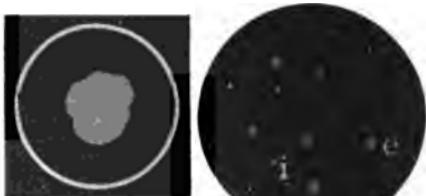
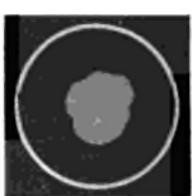


PLATE 47.

**Vibrio cholerae.** (Koch.) Buchner. (Comma Bacillus.)

- I. *Gelatin stab culture*, two days at 22°.
- II. *Gelatin stab culture*, seven days at 22°.
- III. *Gelatin stab culture*, eight days at 22°. Culture from a case of cholera asiatica in Hanover.
- IV. *Gelatin stab culture*, eight days at 22°.
- V. *Agar streak culture*, eleven days at 22°.
- VI. *Agar stab culture*, eight days at 22°. Stab canal.
- VII. *Agar stab culture*, eight days at 22°. Surface growth.
- VIII. *Agar plate*, six days at 22°. Natural size.
- IX. *Agar plate*, six days at 22°. Culture from a case of cholera asiatica in Hanover.

PLATE 48.

**Vibrio cholerae.** (Koch.) Buchner. (*Comma Bacillus.*)

I. *Agar plate*, thirty-six hours at 22°. × 60. To the left superficial, to the right deep colonies.

II. *Agar plate*, two days at 22°. × 60. To the left superficial, to the right deep colonies.

III. *Agar plate*, three days at 22°. × 60. To the left superficial, to the right deep colonies.

IV. *Agar plate*, three weeks at 22°. × 60. To the left superficial, to the right deep colonies.

V. *Agar plate*, five days at 22°. × 60. Colonies of a culture of *cholera asiatica* from Hanover. Superficial and deep colonies.

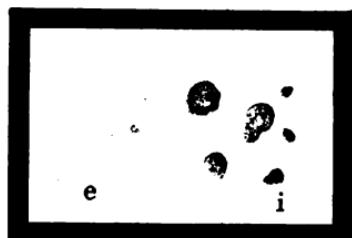
VI. *Gelatin plate*, four days at 22°. Natural size. Deeply sunken funnels of liquefaction.

VII. *Gelatin plate*, fourteen days at 22°. Natural size. Colony with a pronounced formation of zones.

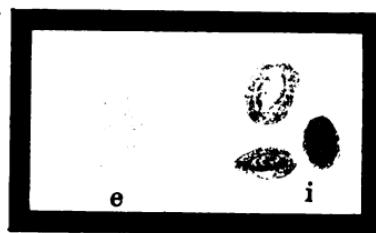
VIII. *Gelatin plate*, four days at 22°. Shallow zones of liquefaction.

IX. *Gelatin plate*, six days at 22°. Superficial sinking in of colonies with concentric zones of liquefaction.

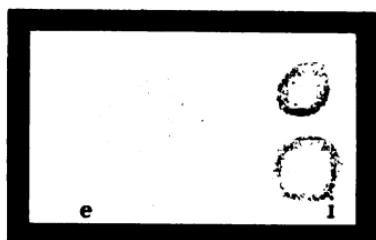
Tab. 48.



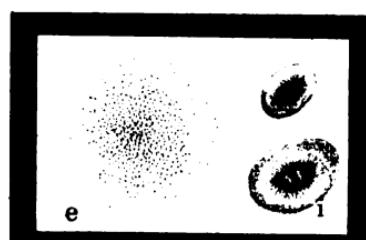
I.



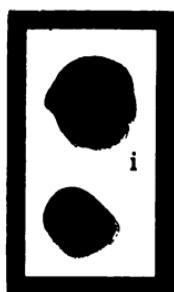
II.



III.



IV.



V.



VI.



VII.



VIII.

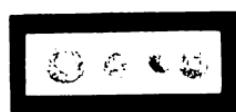


IX.

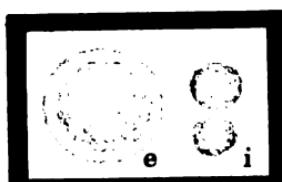




Tab. 49.



I.



II.



III.



IV.



V.



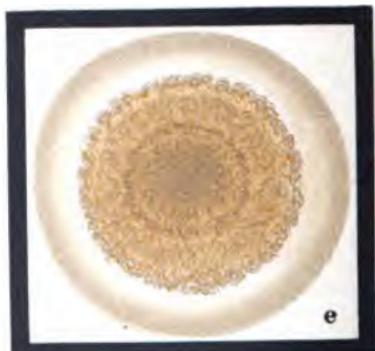
VI.



VII.



VIII.



IX.

PLATE 49.

**Vibrio cholerae.** (Koch.) Buchner. (Comma Bacillus.)

I. *Gelatin plate*, thirty-six hours at 22°. × 60. Deep and superficial colonies.

II. *Gelatin plate*, forty-eight hours at 22°. × 60. To the left superficial, to the right deep colonies.

III. *Gelatin plate*, three days at 22°. × 60. Superficial colonies with zone of liquefaction.

IV. *Gelatin plate*, three days at 22°. × 60. Deep colonies.

V. *Gelatin plate*, four days at 22°. × 60. Superficial colony with zone of liquefaction.

VI. *Gelatin plate*, four days at 22°. × 60. Deep colony.

VII. *Gelatin plate*, five days at 22°. × 60. Deep colony from a culture of cholera from Hanover.

VIII. *Gelatin plate*, five days at 22°. × 60. Superficial colony. Complete liquefaction has already taken place.

IX. *Gelatin plate*, eight days at 22°. × 60. Superficial colony with zone of liquefaction.

PLATE 50.

**Vibrio cholerae.** (Koch.) Buchner. (Comma Bacillus.)

I. *Gelatin plate*, five days at 22°. × 60. Abnormal form of superficial colony.

II. *Gelatin plate*, five days at 22°. × 90. Abnormal form of superficial colony.

III. *Gelatin plate*, five days at 22°. × 60. Deeply sunken superficial colony with a strongly reflecting zone of liquefaction.

IV. *Gelatin plate*, six days at 22°. × 60. Abnormal superficial colony, with dense nucleus, evenly sunken in and with a zone of liquefaction.

V. *Gelatin plate*, six days at 22°. × 60. Abnormal deep colony, without halo, dark, with radiating striations, from the same plate as iv.

VI. *Potato culture*, two days at 22°. Natural size. Soaked in soda solution before inoculation.

VII. *Potato culture*, five days at 22°. Inoculated upon ordinary potato.

Tab. 50.



I.



II.



III.



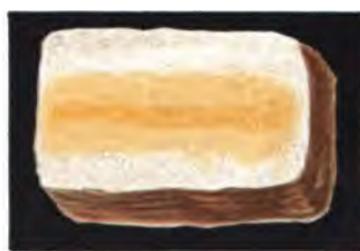
IV.



V.



VII.

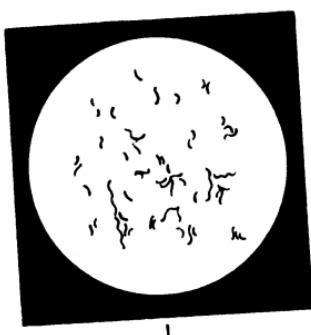


VI.





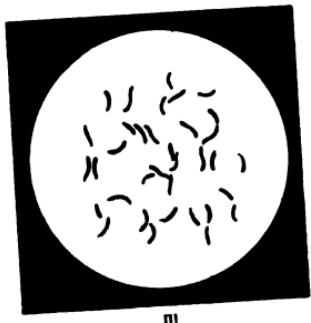
Tab. 51.



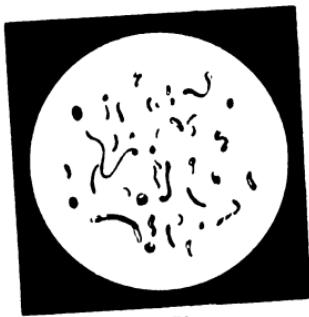
I.



II.



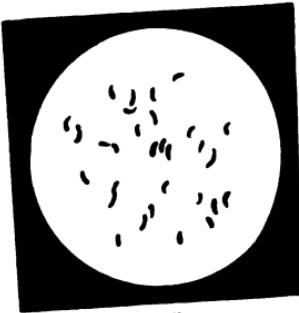
III.



IV.



V.



VI.

PLATE 51.

**Vibrio cholerae.** (Koch.) Buchner. (Comma Bacillus.)

I. *Pure culture in bouillon*, twenty-four hours at 37°.  
Stained with fuchsin.  $\times 1000$ .

II. *Pure culture on agar*, twenty-four hours.  $\times 1000$ .  
Flagella staining according to Löffler.

III. *Pure culture on gelatin*, forty-eight hours. Very  
fresh from water. (Copied from Fränkel and Pfeiffer,  
Fig. 94.)

IV. *Pure culture on agar*, four weeks' old. Involution  
forms, stained with fuchsin.

V. **Vibrio Metschnikovii Gamaleia.** *Smear prepa-*  
*ration from pigeon's blood.* (Copied after Fränkel and  
Pfeiffer, Fig. 102.)

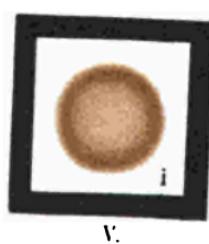
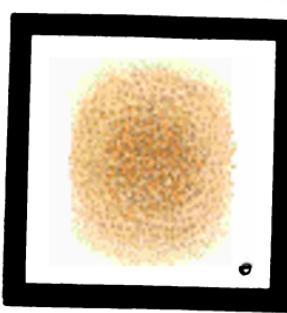
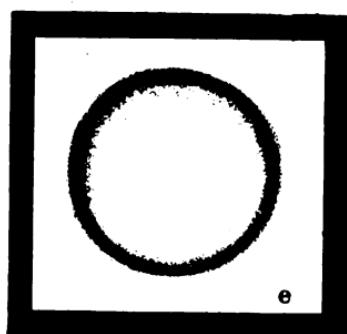
VI. **Vibrio Proteus** Buchner. *Pure culture in bouil-*  
*lon*, twenty-four hours. Stained with fuchsin.

PLATE 52.

**Vibrio proteus.** Buchner. (Vibrio Finkler.)

- I. *Gelatin stab culture*, one day at 22°.
- II. *Gelatin stab culture*, four days at 22°.
- III. *Gelatin plate*, one day at 22°. Natural size.
- IV. *Gelatin plate*, four days at 22°. × 60. Superficial colony.
- V. *Gelatin plate*, four days at 22°. × 60. Deep colony.
- VI. *Agar streak culture*, six days at 22°.
- VII. *Agar plate*, four days at 22°. × 60. Superficial colony.
- VIII. *Agar plate*, four days at 22°. × 60. Deep colony.
- IX. *Agar plate*, four days at 22°. Natural size.

Tab. 52.







Tab. 55.

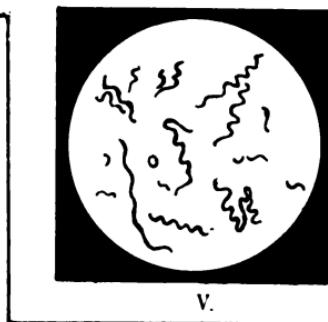
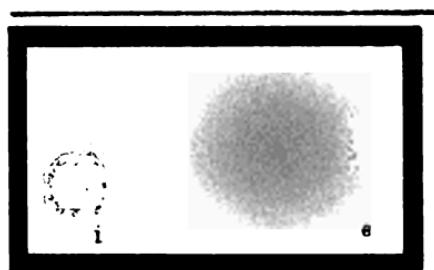
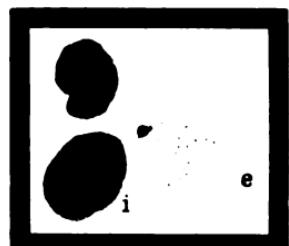


PLATE 53.

**Vibrio danubicus** Heider, **Vibrio berolinensis** Rubner,  
**Vibrio aquatis** Günther.

I. *Vibrio danubicus*: Gelatin stab culture, three days at 22°.

II. *Vibrio aquatis*: Gelatin stab culture, three days at 22°.

III. *Vibrio danubicus*: Gelatin plate, three days at 22°.  
× 60. To the right superficial, to the left deep colony.

IV. *Vibrio danubicus*: Microscopic preparation. Pure culture on agar, twenty-four hours. Stained with fuchsin.  
× 800.

V. *Vibrio berolinensis*: Gelatin plate, three days at 22°. × 60. To the right superficial, to the left deep colony.

VI. *Vibrio berolinensis*: Microscopic preparation. Pure culture from agar, twenty-four hours. × 800. Stained with fuchsin.

VII. *Vibrio aquatis*: Gelatin plate, three days at 22°.  
× 60. Deep colonies, swarming outward from one point forming secondary ones.

VIII. *Vibrio aquatis*: Microscopic preparation. Pure culture on agar, twenty-four hours at 22°. × 800. Stained with fuchsin.

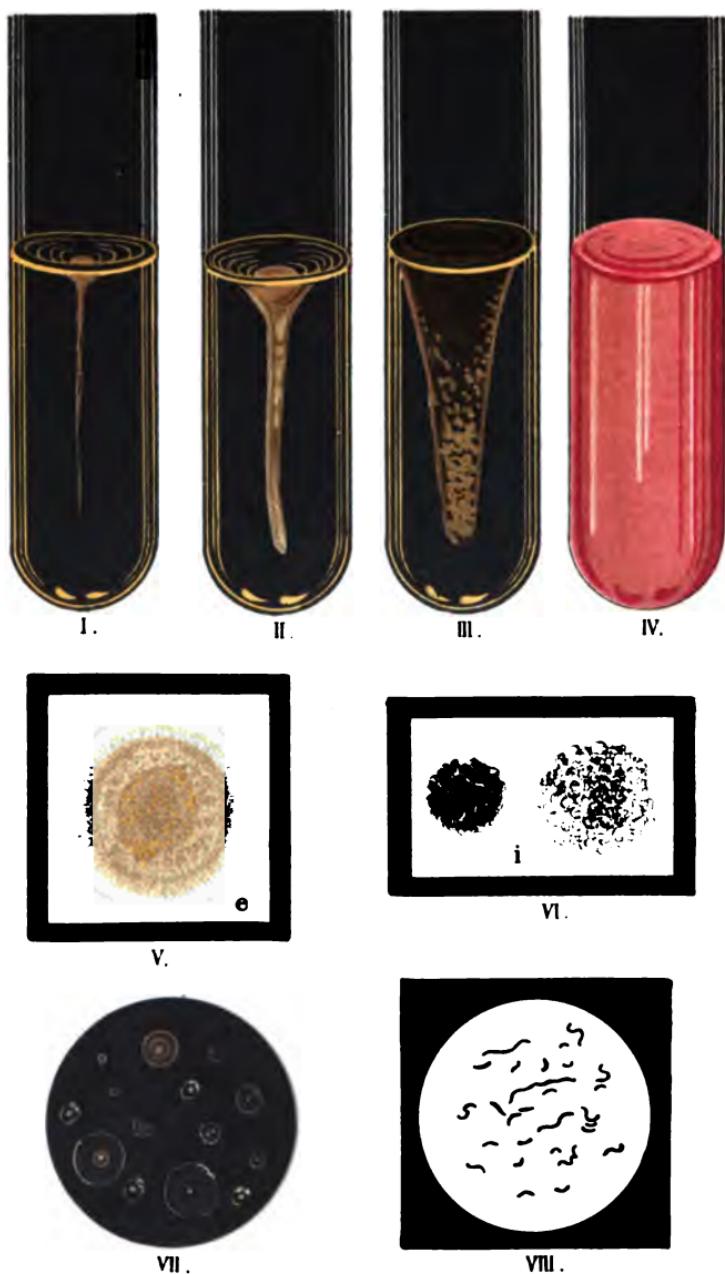
IX. *Vibrio aquatis*: Gelatin plate, three days at 22°.  
× 60. To the right superficial, to the left deep colony.

PLATE 54.

**Vibrio albensis.** Lehm. and Neum. (Phosphorescent  
Elbe Vibrio.)

- I. *Gelatin stab culture*, twenty-four hours at 22°.
- II. *Gelatin stab culture*, four days at 22°.
- III. *Gelatin stab culture*, ten days at 22°.
- IV. *Indol reaction* after ten days. Bouillon culture  
with dilute sulphuric acid, warmed.
- V. *Gelatin plate*, three days at 22°. × 60. Super-  
ficial colony.
- VI. *Gelatin plate*, three days at 22°. × 60. Deep  
colonies.
- VII. *Gelatin plate*, thirty-six hours at 22°. Natural  
size.
- VIII. *Microscopic preparation*. Pure culture from agar,  
forty-eight hours. Stained with fuchsin.

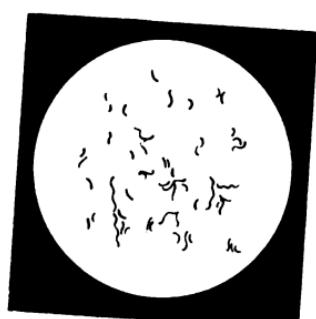
Tab. 54.







Tab. 51.



I.



II.



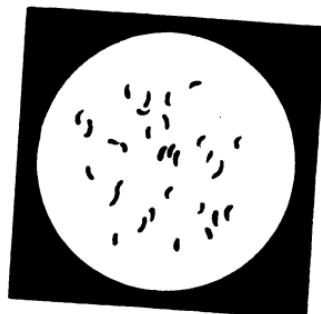
III.



IV.



V.



VI.

PLATE 51.

**Vibrio cholerae.** (Koch.) Buchner. (Comma Bacillus.)

I. *Pure culture in bouillon*, twenty-four hours at 37°.  
Stained with fuchsin.  $\times 1000$ .

II. *Pure culture on agar*, twenty-four hours.  $\times 1000$ .  
Flagella staining according to Löffler.

III. *Pure culture on gelatin*, forty-eight hours. Very  
fresh from water. (Copied from Fränkel and Pfeiffer,  
Fig. 94.)

IV. *Pure culture on agar*, four weeks' old. Involution  
forms, stained with fuchsin.

V. **Vibrio Metschnikovii Gamaleia.** *Smear prepa-*  
*ration from pigeon's blood.* (Copied after Fränkel and  
Pfeiffer, Fig. 102.)

VI. **Vibrio Proteus** Buchner. *Pure culture in bouil-*  
*lon*, twenty-four hours. Stained with fuchsin.

PLATE 52.

**Vibrio proteus.** Buchner. (Vibrio Finkler.)

- I. *Gelatin stab culture*, one day at 22°.
- II. *Gelatin stab culture*, four days at 22°.
- III. *Gelatin plate*, one day at 22°. Natural size.
- IV. *Gelatin plate*, four days at 22°. × 60. Superficial colony.
- V. *Gelatin plate*, four days at 22°. × 60. Deep colony.
- VI. *Agar streak culture*, six days at 22°.
- VII. *Agar plate*, four days at 22°. × 60. Superficial colony.
- VIII. *Agar plate*, four days at 22°. × 60. Deep colony.
- IX. *Agar plate*, four days at 22°. Natural size.

Tab. 52.

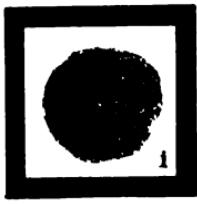
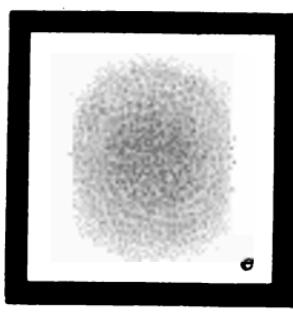




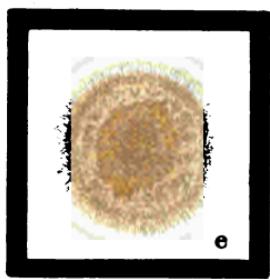


PLATE 54.

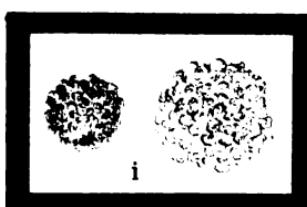
**Vibrio albensis.** Lehm. and Neum. (Phosphorescent  
Elbe Vibrio.)

- I. *Gelatin stab culture*, twenty-four hours at 22°.
- II. *Gelatin stab culture*, four days at 22°.
- III. *Gelatin stab culture*, ten days at 22°.
- IV. *Indol reaction* after ten days. Bouillon culture  
with dilute sulphuric acid, warmed.
- V. *Gelatin plate*, three days at 22°. × 60. Super-  
ficial colony.
- VI. *Gelatin plate*, three days at 22°. × 60. Deep  
colonies.
- VII. *Gelatin plate*, thirty-six hours at 22°. Natural  
size.
- VIII. *Microscopic preparation*. Pure culture from agar,  
forty-eight hours. Stained with fuchsin.

Tab. 54.



V.



VI.

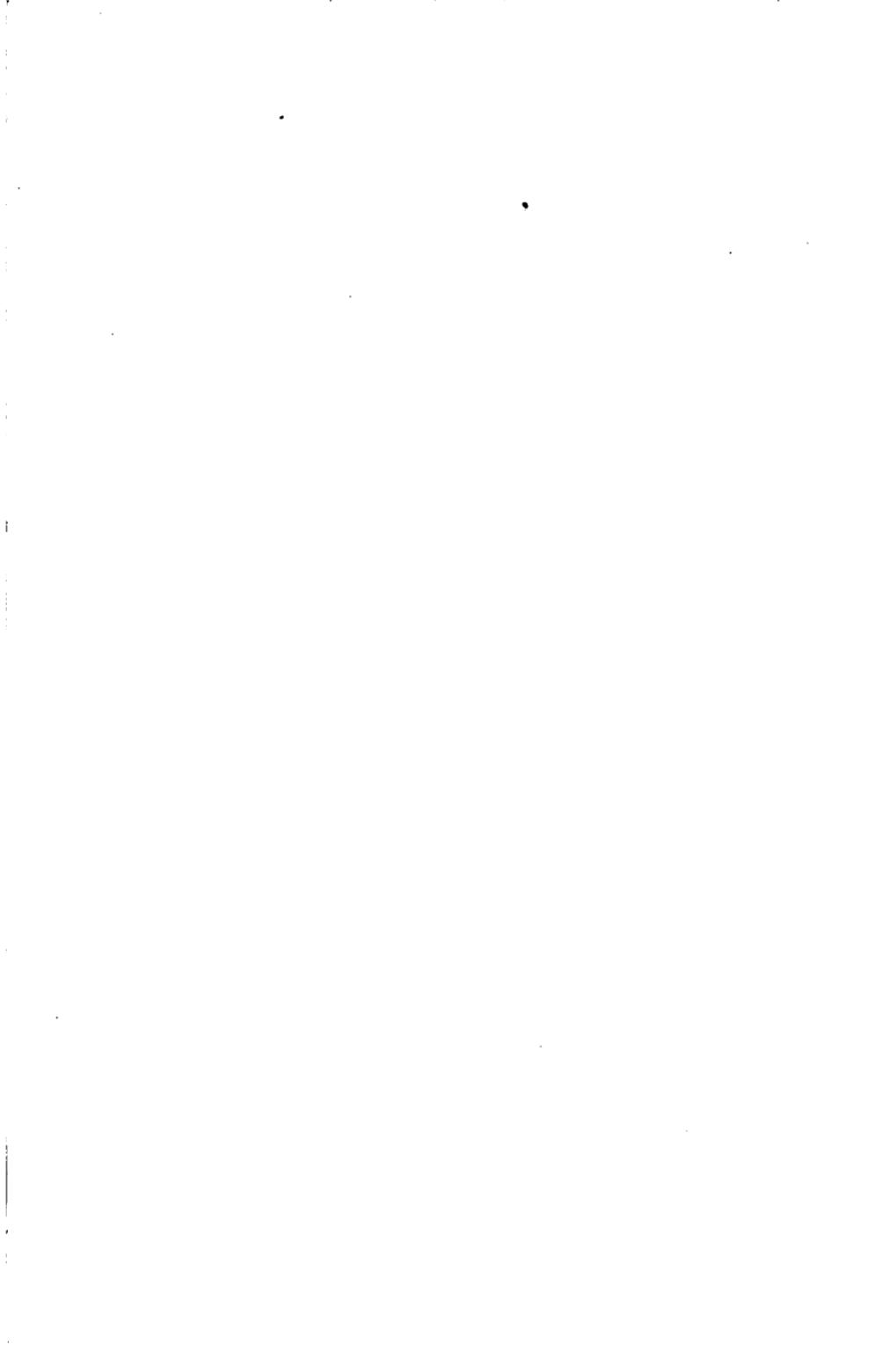


VII.



VIII.





Tab. 55.

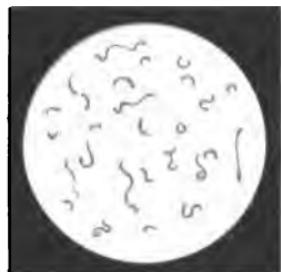
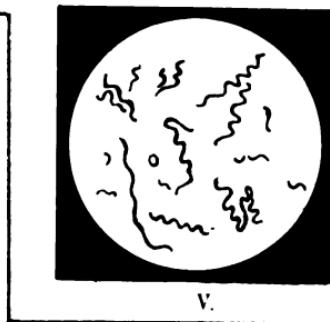
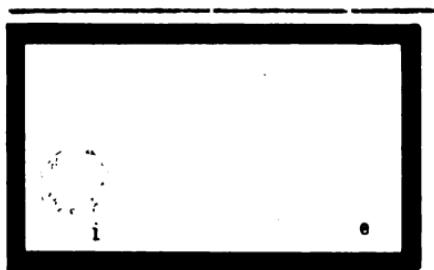
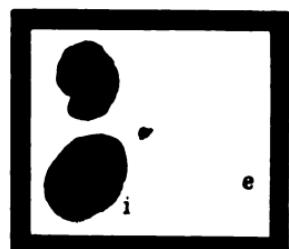


PLATE 55.

*Spirillum rubrum.* Von Esmarch.

- I. *Agar stab culture*, ten days at 22°.
- II. *Agar streak culture*, twenty days at 22°.
- III. *Agar plate*, five days at 22°. × 60. (e) Superficial, (i) deep colonies.
- IV. *Gelatin plate*, seven days at 22°. × 60. (e) Superficial, (i) deep colonies.
- V. *Microscopic preparation*. Pure culture from bouillon, diluted ten times; two days at 37°. × 1000. Stained with fuchsin.
- V A. *Flagella preparation of spirillum rubrum*. × 1000. Stained according to Löffler.



V A.

*Spirillum concentricum.* Kitasato.

- VI. *Agar plate*, seven days at 22°. × 60. (e) Superficial, (i) deep colonies.
- VII. *Gelatin plate*, three days at 22°. × 60. (e) Superficial, (i) deep colonies.
- VIII. *Agar plate*, seven days at 22°. Natural size.
- IX. *Microscopic preparation*. Pure culture in bouillon, two days at 37°. × 1000. Stained with fuchsin.

PLATE 56.

**Spirilla.**

I. **Spirillum serpens** Müller. With difficulty staining protoplasmic border.  $\times$  about 1000. Stained with fuchsin. Copied after Zettnow (C. B. x, Taf. 5).

II. **Spirilla from Nasal Mucus.** Smear preparation with two cells.  $\times$  about 1000. Copied after Weibel (C. B. II, p. 468, Fig. 1).

III. **Spirilla from Nasal Mucus.** Agar plate. Pure culture.  $\times$  about 1000. (Copied C. B. II, p. 468, Fig. 2.)

IV. **Spirilla from Nasal Mucus.** Gelatin plate. Pure culture.  $\times$  about 1000. (Copied C. B. II, p. 468, Fig. 3.)

V. **Spirillum undula** Müller. With flagella.  $\times$  about 800. Copied after Löffler (C. B. vi, Taf. 1, Fig. 2).

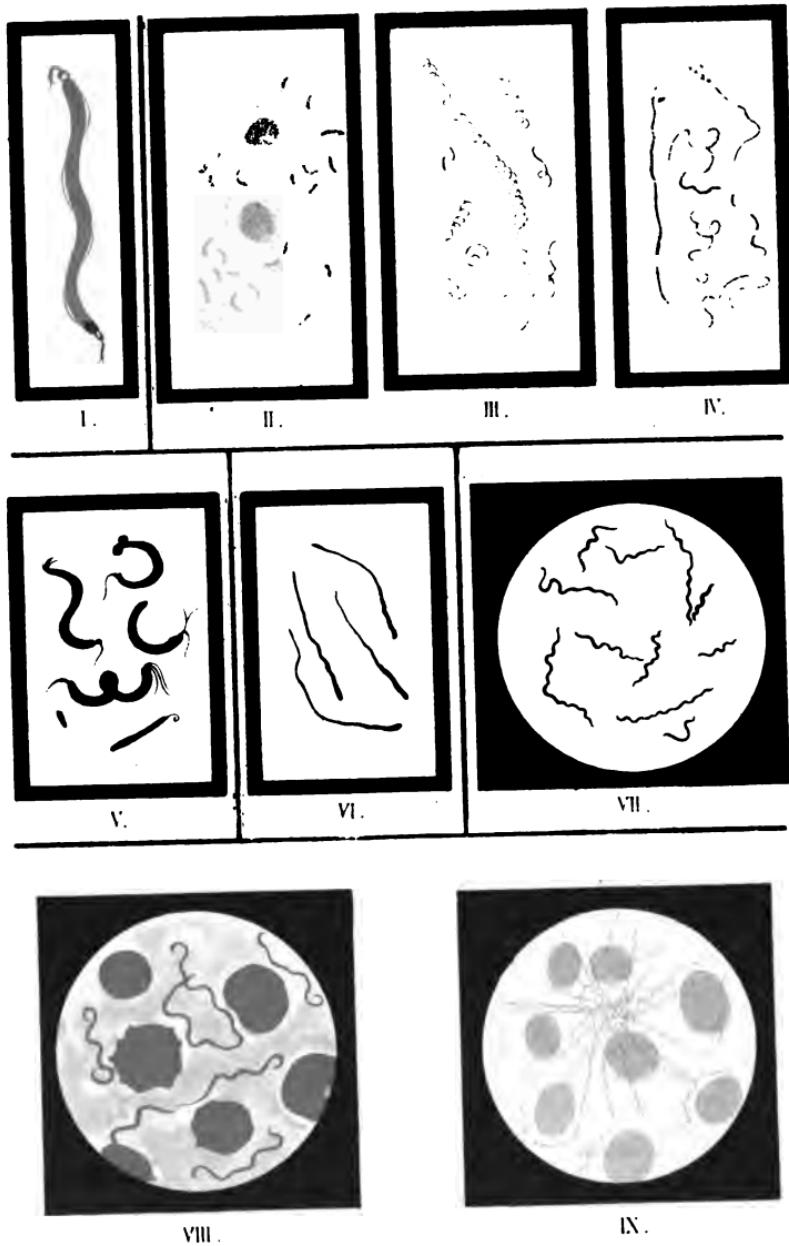
VI. **Vibrio spermatozoides** Löffler.  $\times$  about 1000. Copied after Löffler (C. B. vii, Taf. III, Fig. 7).

VII. **Spirochæte from Mucus of the Mouth.** (Copied after Löffler: Bakterien, Taf. 1, Fig. 4.)

VIII. **Spirochæte Obermeieri** Cohn. Smear preparation from human blood. (Copied after Fränkel and Pfeiffer, Atlas, No. 134.)

IX. **Spirilla of relapsing fever.** Human blood. Spirilla grouped in the form of a star. (Copied after M. J. Soudakewitsch: Annales de l'instit. Pasteur, Bd. v, 1891, p. 514, plate 14, Fig. 1.)

Tab. 56.







**Tab. 57.**

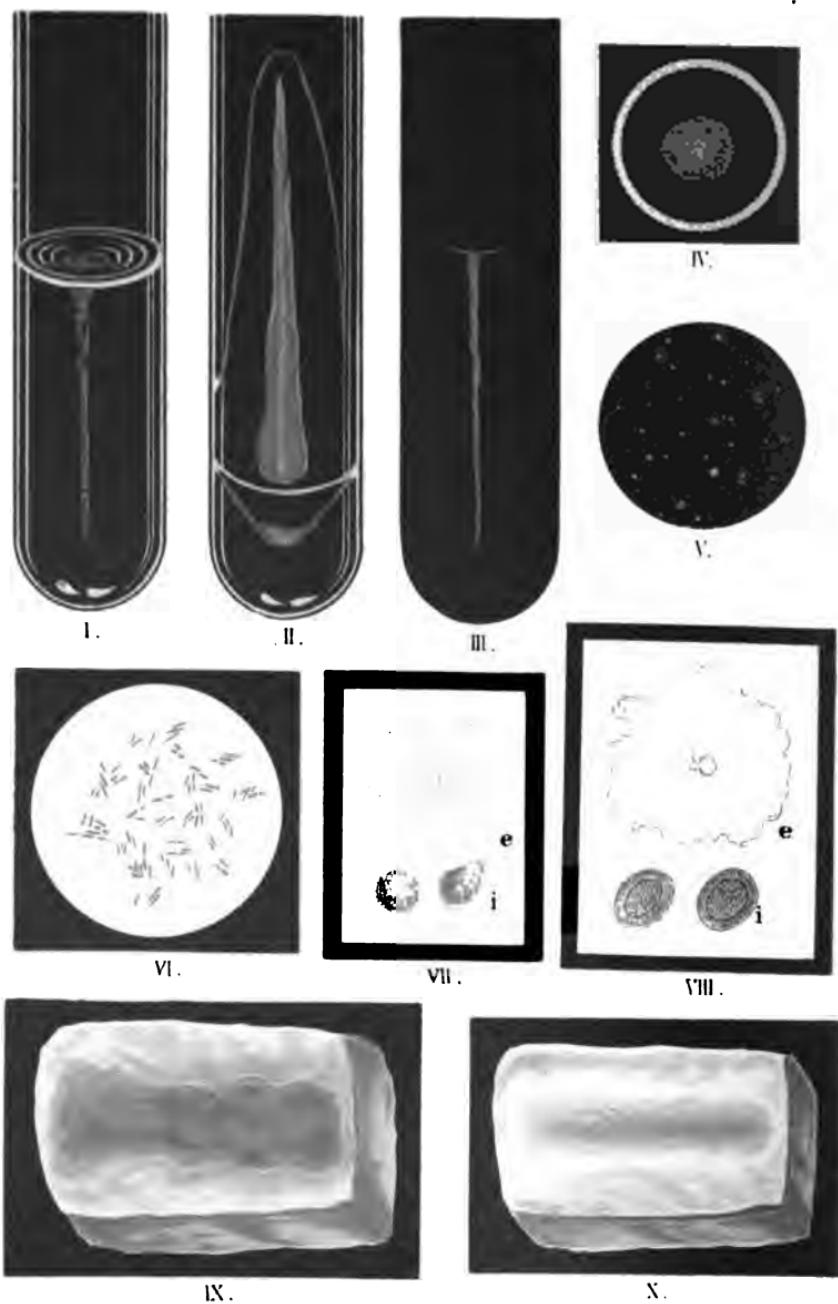


PLATE 57.

**Corynebacterium mallei.** (Löffler.) L. and N.  
(Glanders.)

I. *Gelatin stab culture*, six days at 22°.

II. *Agar streak culture*, six days at 37°. The central whitish streak is not always so pronounced.

III. *Agar stab culture*, three days at 37°. Stab canal.

IV. *Agar stab culture*, three days at 37°. Surface growth.

V. *Gelatin plate*, five days at 22°. Natural size.

VI. *Microscopic preparation*. Pure culture.  $\times 800$ .  
Stained with fuchsin.

VII. *Agar plate*, two days at 22°.  $\times 60$ . Upper, superficial; lower, deep colonies.

VIII. *Gelatin plate*, four days at 22°.  $\times 60$ . Upper colony superficial, lower ones deep.

IX. *Potato culture*, two days at 37°.

X. *Potato culture*, twenty days at 37°.

XI. *Single bacteria*. Highly magnified. In many places the stain is taken poorly or not at all.



XI.

XII. *Glycerin-agar plate*. Microscopic preparation.  
 $\times 1200$ . Branching and formation of clubs.



XII.

PLATE 58.

**Corynebacterium diphtheriae.** (Klebs, Löffler.) L.  
and N.

**Corynebacterium pseudodiphtheriticum.** (Hofmann-  
Wellenhof.) Lehm. and Neum.

**Corynebacterium xerosis.** (Kuschbert, Neisser.)  
Lehm. and Neum.

I. **Coryneb. diphtheriae.** *Glycerin-agar streak culture*, three days at 37°. Luxuriant growth; culture moist.

II. **Coryneb. diphtheriae.** *Glycerin-agar streak culture*, three days at 37°. Delicate growth.

III. **Coryneb. pseudodiphtherit.** *Glycerin-agar streak culture*, three days at 37°. Luxuriant growth, culture moist.

IV. **Coryneb. xerosis.** *Glycerin-agar streak culture*, three days at 37°. Delicate growth; growth dry and dull.

V. **Coryneb. pseudodiphtherit.** *Glycerin-agar stab culture*. Surface growth, ten days at 37°. The culture is reproduced on account of its atypical brown color.

VI. **Coryneb. diphtheriae.** *Gelatin stab culture*. Surface growth, ten days at 22°. The color fluctuates from white to dirty yellowish.

VII. **Coryneb. diphtheriae:**  

Natural size.	(a) <i>Glycerin-agar plate</i> . Colonies upon the surface, three days at 37°. Luxuriant growth. The same culture as I.
	(b) <i>Glycerin-agar plate</i> . Colonies upon the surface, three days at 37°. Delicate growth. The same culture as II.

VIII a. **Coryneb. pseudodiphtherit.** *Glycerin-agar plate*. Colonies lying upon the surface, three days at 37°. Natural size. Luxuriant growth. Answers to culture III.

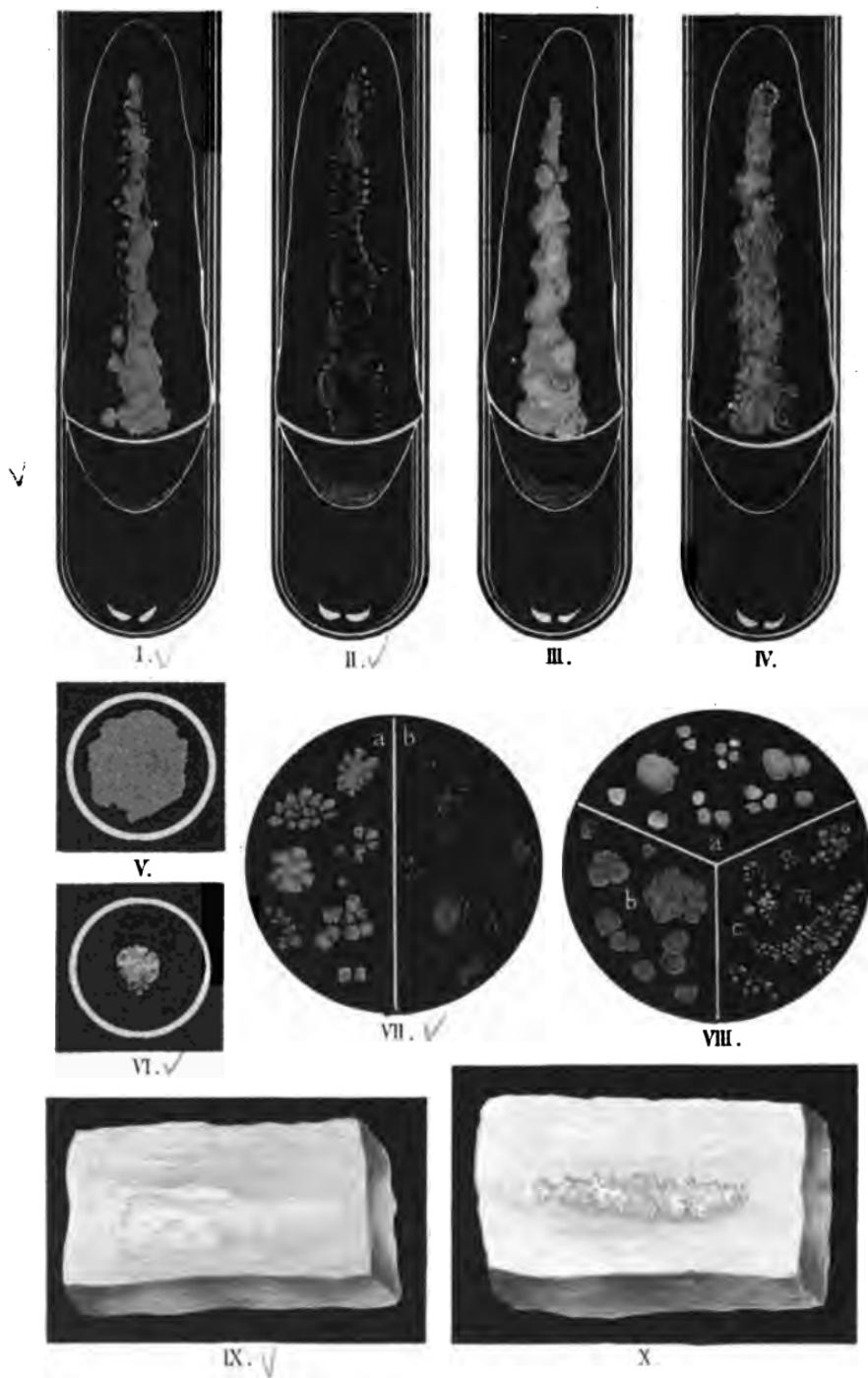
VIII b. **Coryneb. xerosis.** *Glycerin-agar plate*. Colonies lying upon the surface, three days at 37°. Natural size. Dry, dull growth. Answers to culture IV.

VIII c. **Coryneb. xerosis.** *Glycerin-agar plate*. Colonies lying upon the surface, three days at 37°. Natural size. Delicate growth. Sometimes it may be still more delicate.

IX. **Coryneb. diphtheriae.** *Potato culture*, ten days at 22°. The growth is typical, like a delicate veil, which in many places leaves no trace on the potato.

X. **Coryneb. pseudodiphtherit.** *Potato culture*, ten days at 22°. The growth is sharply outlined, white to dirty yellowish.

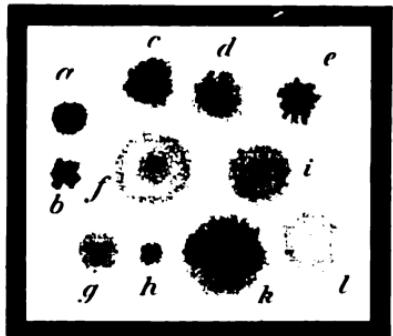
Tab. 58.



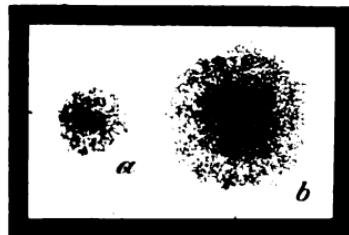




Tab. 59.



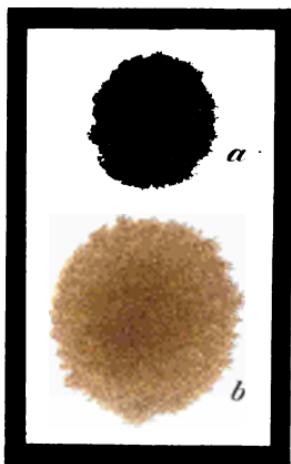
I. ✓



II. ✓



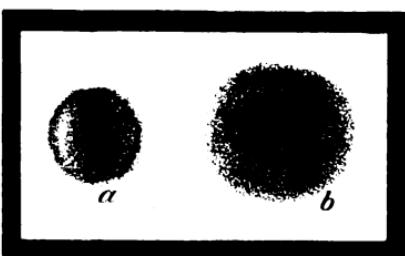
III. ✓



IV.



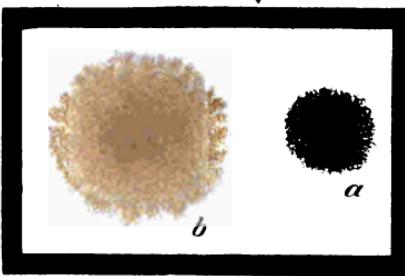
V.



VI. ✓



VII.



VIII.

PLATE 59.

**Corynebacterium diphtheriae.** (Klebs, Löffler.)  
L. and N.

**Corynebacterium pseudodiphtheriticum.** (Hofmann-Wellenhof.) Lehm. and Neum.

**Corynebacterium xerosis.** (Kuschbert, Neisser.)  
Lehm. and Neum.

I. **Coryneb. diphtheriae.** *Plate cultures* (Ascites-fluid-agar and glycerin-agar).  $\times 60$ . Superficial colonies, twenty-four hours at  $37^\circ$ . Cultures of different origin.

II. **Coryneb. diphtheriae.** *Plate culture* (glycerin-agar).  $\times 60$ . Superficial colonies, forty-eight hours at  $37^\circ$ . The same culture as I, g, h.

III. **Coryneb. diphtheriae.** *Plate culture* (ascites-fluid-agar).  $\times 60$ . Superficial colony, five days at  $37^\circ$ . The same culture as I, c, e, and Plate 58, II.

IV. **Coryneb. pseudodiphtherit.** *Plate culture* (glycerin-agar).  $\times 60$ . Superficial colonies, forty-eight hours at  $37^\circ$ . The same culture as Plate 58, III.

V. **Coryneb. xerosis.** *Plate culture* (glycerin-agar).  $\times 60$ . Superficial colony, forty-eight hours, at  $37^\circ$ . Dry, dull, and very opaque. The same culture as Plate 58, IV, VIII b.

VI. **Coryneb. diphtheriae.** *Plate culture* (ascites-fluid-agar).  $\times 60$ . Superficial colonies, forty-eight hours at  $37^\circ$ . The same culture as I, f, l, and Plate 58, I, VII a.

VII. **Coryneb. diphtheriae.** *Plate culture.* The same as VI, but ten days old.

VIII. **Coryneb. xerosis.** *Plate culture* (glycerin-agar).  $\times 60$ . Superficial colonies, forty-eight hours at  $37^\circ$ . The same culture as Plate 58, VIII c.

PLATE 60.

**Corynebacterium diphtheriae** (Klebs, Löffler). L. and N.

**Corynebacterium pseudodiphtheriticum.** (Hofmann-Wellenhof.) Lehm. and Neum.

**Corynebacterium xerosis** (Kuschbert, Neisser). Lehm. and Neum.

I. **Coryneb. diphtheriae.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin. Corresponds to Plate 58, II, VII b; and Plate 59, II.

II. **Coryneb. diphtheriae.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin. Corresponds to Plate 58, I, VII a; and Plate 59, VI.

III. **Coryneb. diphtheriae.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin.

IV. **Coryneb. diphtheriae.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin.

V. **Coryneb. pseudodiphtherit.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin.

VI. **Coryneb. pseudodiphtherit.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin. Corresponds to Plate 58, III, VIII a; Plate 59, I, IV.

VII. **Coryneb. xerosis.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin. Corresponds to Plate 58, IV, VIII b; and Plate 59, V.

VIII. **Coryneb. xerosis.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin.

IX. **Coryneb. xerosis.** *Glycerin-agar*, forty-eight hours at 37°.  $\times 1000$ . Stained with fuchsin. Corresponds to Plate 58, VIII c.

X. **Coryneb. diphtheriae.** *Bovine blood-serum*, solidified at 100°, eighteen hours at 35°.  $\times 1000$ . Staining of Neisser's granules. The polar staining is characteristic. Corresponds to figure 1.

XI. **Coryneb. pseudodiphtherit.** *Bovine blood-serum*, solidified at 100°, eighteen hours at 35°.  $\times 1000$ . Staining of Neisser's granules. These occur also in many varieties of pseudodiphtheria, but not with such regularity at both poles.

XII. **Coryneb. diphtheriae.** *Glycerin-agar*, four days at 37°.  $\times 1000$ . Stained with fuchsin. True branching.

XIII. **Coryneb. diphtheriae.** Single organisms, highly magnified, schematic.



XIII.



I



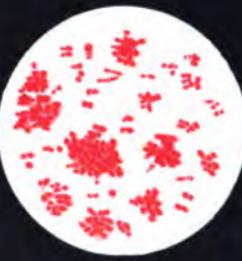
II



III



IV



V



VI



VII



VIII



IX



X



XI



XII





Tab. 61.



I.



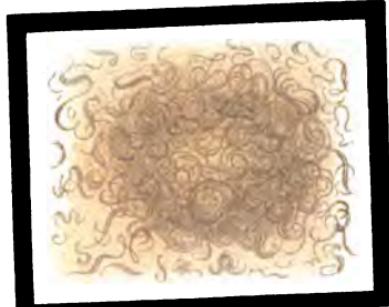
II.



III.



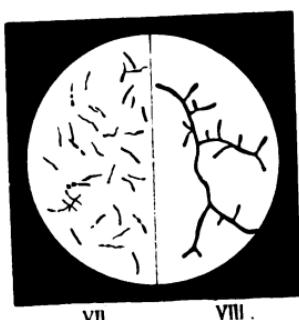
IV.



V.



VI.



VII.

VIII.



IX.

PLATE 61.

**Mycobacterium tuberculosis** (Koch). Lehm. and Neum. (Tubercle Bacillus.)

- I. Glycerin-agar streak culture, fourteen days at 37°.
- II. Glycerin-agar streak culture, forty days at 37°.
- III. Potato culture, forty days at 37°.
- IV. Colonies of tubercle bacilli from a blood-serum culture. × 700. (Copied after R. Koch, Aetiologie der Tuberkulose. Mitteilungen des Kaiserl. Gesundheitsamt, Bd. 2, Taf. IX, 44.)
- V. Culture, upon blood-serum, from a piece of a freshly extirpated scrofulous gland. (Copied like the above, Bd. 2, Taf. IX, 44.)
- VI. Giant cell with radially arranged bacilli. From a caseous bronchial gland in a case of miliary tuberculosis. (Copied like above, Bd. 2, Taf. II, 9.)
- VII. Microscopic preparation. Pure culture, stained according to Ziehl. × 1000.
- VIII. Branching of tubercle bacilli. (Copied after Hayo Bruns, C. B. xvii, No. 23.)
- IX. Microscopic preparation. Sputum, stained according to Ziehl. × 1000.
- X. Single bacteria, highly magnified.



X.

PLATE 62.

**Mycobacterium lepræ.** (Arm. Hansen.) Lehm. and Neum.

I. *Giant cell from a leprous ulcer of the epiglottis.* × about 1000. Stained according to Rusell. (Copied from Seifert and Kahn, *Atlas der Histopathologie der Nase*, 1875, Taf. 38, Fig. 75 b.)

II. *Transverse section of a blood-vessel in a leprous testicle.* Bacilli in endothelium and in a white blood-corpuscle. Stained by Gram's method, Bismarck brown, eosin, oil of bergamot. × about 1000. (Copied as No. III, fig. v.)

III. *Ulnar nerve, longitudinal section*, stained like above. (Copied from Lie, *pathologische Anatomie der Lepra*; *Archiv für Dermatologie und Syphilis*, Bd. xxix, 1895, Taf. vi, Fig. VII.)

IV. *Smear preparation from nasal mucus.* Stained by method for tubercle bacillus. From a preparation of Dr. Dieudonné. × 1000.

**Mycobacterium tuberculosis γ piscicola.** L. and N.

V. *Streak culture* (glycerin-agar), one month old at 22°.

VI. *Plate culture* (glycerin-agar), ten days at 22°. Natural size. Superficial colonies.

VII. *Plate culture* (glycerin-agar), six days at 22°. × 60. Superficial colony. The dark shadows and bright lights represent the strong reflection of the cartilaginous colony.

VIII. *Potato culture*, fourteen days at 22°. Sometimes also more homogeneous upon the surface.

IX. *Microscopic preparation.* Stained by the method for the tubercle bacillus. × 1000.



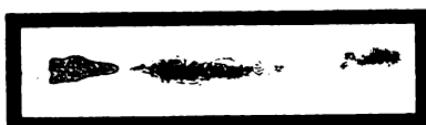
I.



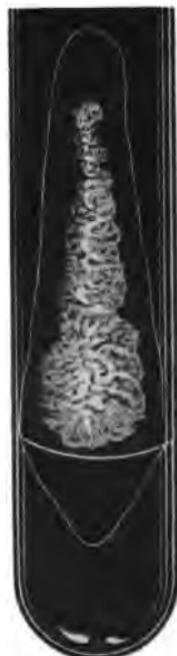
II.



IV.



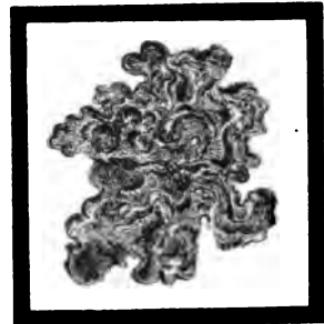
III.



V.



XI.



VII.



VIII



VI





Tab. 63.

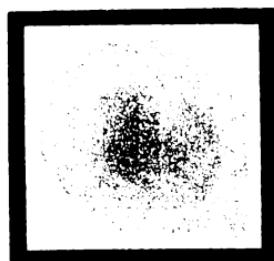
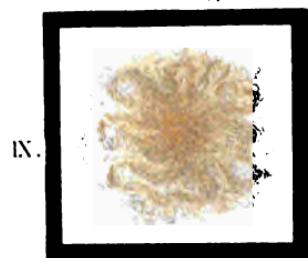
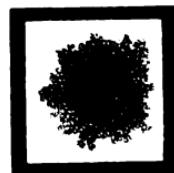
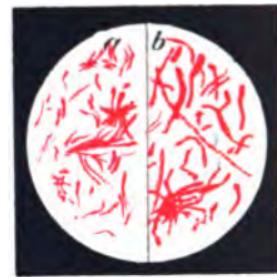


PLATE 63.

**Mycobacterium lacticola  $\beta$  perrugosum.** L. and N.

I. *Streak culture* (glycerin-agar), two months old; three days at 37°, then at 22°. Much elevated and wrinkled.

II. *Plate culture* (glycerin-agar), six days at 37°.  $\times$  60. Superficial colony.

III. *Plate culture* (glycerin-agar), forty-eight hours at 37°.  $\times$  60. Superficial colony.

IV. *Plate culture* (glycerin-agar), three days at 37°. Natural size. Superficial colonies. Later the same were larger, more wrinkled, and reddish.

V. *Potato culture*, six days at 22°. Later the same became still more wrinkled.

VI. *Microscopic preparation.* Glycerin-agar: (a) Three days at 37°.  $\times$  1000. Stained with fuchsin. (b) Two months at 22°.  $\times$  1000. Stained with fuchsin.

VII. *Microscopic preparation.* Smear from the peritoneal fluid of a guinea-pig, inoculated with butter.  $\times$  1000. Stained with tubercle bacillus stain. (From a preparation of Dr. Dieudonné.)

**Mycobacterium phlei.** Lehm. and Neum.

VIII. *Streak culture* (glycerin-agar), eight days at 22°. The culture at first is pale orange; later, it becomes darker and wrinkled.

IX. *Plate culture* (glycerin-agar), three days at 22°.  $\times$  60. Superficial colony.

X. *Plate culture* (glycerin-agar), eight days at 22°.  $\times$  60. Superficial colony.

XI. *Plate culture* (glycerin-agar), eight days at 22°. Natural size. Superficial colonies.

XII. *Microscopic preparation.* Glycerin-agar: (a) Three days at 37°.  $\times$  1000. Stained with fuchsin. (b) Two months at 22°.  $\times$  1000. Stained with fuchsin.

PLATE 64.

**Mycobacterium lacticola  $\alpha$  planum.** L. and N.

- I. *Streak culture* (ordinary agar), two months at 22°.
- II. *Streak culture* (glycerin-agar), six days at 37°.
- III. *Streak culture* (glycerin-agar), three months at 22°.

The culture at first is whitish; later, it becomes very intensely orange-red.

- IV. *Streak culture* (gelatin), six days at 22°.
- V. *Potato culture*, six days at 22°. Its appearance varies widely. Sometimes it is lighter, sometimes darker, sometimes moister, sometimes drier, sometimes smooth, sometimes wrinkled.

VI. *Plate culture* (gelatin), six days at 22°.  $\times$  60. (a) Superficial colony, resembling the colon; (b) deep colony.

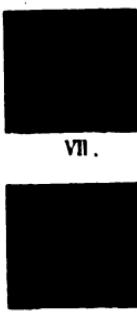
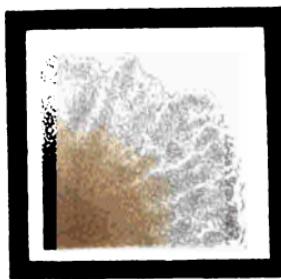
VII. *Plate culture* (gelatin), six days at 22°. Natural size.

VIII. *Plate culture* (glycerin-agar), three days at 37°.  $\times$  60. Superficial colony.

IX. *Plate culture* (glycerin-agar), three days at 37°. Natural size.

X. *Microscopic preparation.* Glycerin-agar, three days.  $\times$  1000. Stained with fuchsin. The size of the rods scarcely varies in very old cultures. There as here are found small and large, slender and thick rods.

Tab. 64.



Tab. 61.

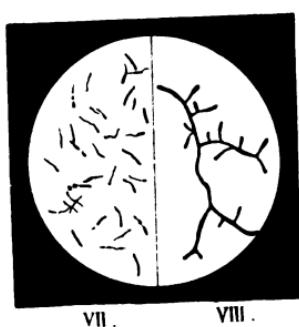
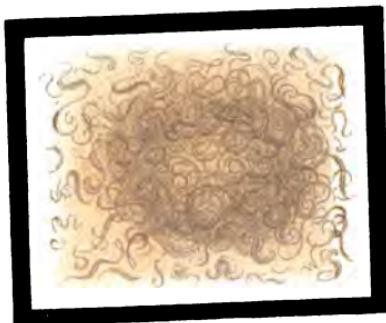


PLATE 61.

**Mycobacterium tuberculosis** (Koch). Lehm. and Neum. (Tubercle Bacillus.)

- I. *Glycerin-agar streak culture*, fourteen days at 37°.
- II. *Glycerin-agar streak culture*, forty days at 37°.
- III. *Potato culture*, forty days at 37°.
- IV. *Colonies of tubercle bacilli from a blood-serum culture.*  $\times 700$ . (Copied after R. Koch, Aetiologie der Tuberkulose. Mitteilungen des Kaiserl. Gesundheitsamt, Bd. 2, Taf. IX, 44.)
- V. *Culture, upon blood-serum*, from a piece of a freshly extirpated scrofulous gland. (Copied like the above, Bd. 2, Taf. IX, 44.)
- VI. *Giant cell with radially arranged bacilli.* From a caseous bronchial gland in a case of miliary tuberculosis. (Copied like above, Bd. 2, Taf. II, 9.)
- VII. *Microscopic preparation.* Pure culture, stained according to Ziehl.  $\times 1000$ .
- VIII. *Branching of tubercle bacilli.* (Copied after Hayo Bruns, C. B. XVII, No. 23.)
- IX. *Microscopic preparation.* Sputum, stained according to Ziehl.  $\times 1000$ .
- X. *Single bacteria, highly magnified.*



X.

PLATE 62.

**Mycobacterium lepræ.** (Arm. Hansen.) Lehm. and Neum.

I. *Giant cell from a leprous ulcer of the epiglottis.*  $\times$  about 1000. Stained according to Rusell. (Copied from Seifert and Kahn, *Atlas der Histopathologie der Nase*, 1875, Taf. 38, Fig. 75 b.)

II. *Transverse section of a blood-vessel in a leprous testicle.* Bacilli in endothelium and in a white blood-corpuscle. Stained by Gram's method, Bismarck brown, eosin, oil of bergamot.  $\times$  about 1000. (Copied as No. III, fig. v.)

III. *Ulnar nerve, longitudinal section*, stained like above. (Copied from Lie, *pathologische Anatomie der Lepra*; *Archiv für Dermatologie und Syphilis*, Bd. xxix, 1895, Taf. vi, Fig. VII.)

IV. *Smear preparation from nasal mucus.* Stained by method for tubercle bacillus. From a preparation of Dr. Dieudonné.  $\times$  1000.

**Mycobacterium tuberculosis  $\gamma$  piscicola.** L. and N.

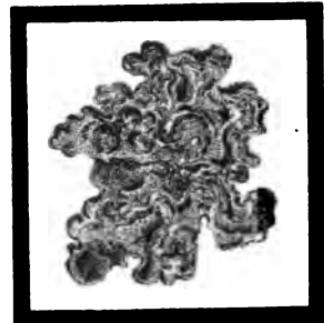
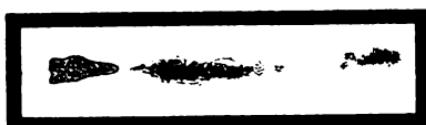
V. *Streak culture* (glycerin-agar), one month old at 22°.

VI. *Plate culture* (glycerin-agar), ten days at 22°. Natural size. Superficial colonies.

VII. *Plate culture* (glycerin-agar), six days at 22°.  $\times$  60. Superficial colony. The dark shadows and bright lights represent the strong reflection of the cartilaginous colony.

VIII. *Potato culture*, fourteen days at 22°. Sometimes also more homogeneous upon the surface.

IX. *Microscopic preparation.* Stained by the method for the tubercle bacillus.  $\times$  1000.







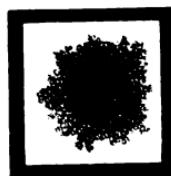
Tab. 63.



II.



V.



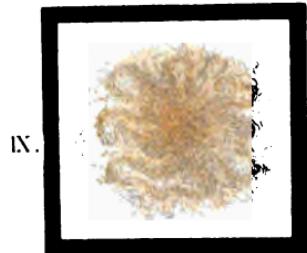
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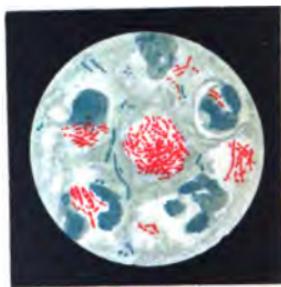
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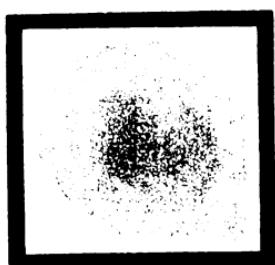
IX.



XI.



VII.



X.



XII.

PLATE 63.

**Mycobacterium lacticola  $\beta$  perrugosum.** L. and N.

I. *Streak culture* (glycerin-agar), two months old; three days at 37°, then at 22°. Much elevated and wrinkled.

II. *Plate culture* (glycerin-agar), six days at 37°.  $\times$  60. Superficial colony.

III. *Plate culture* (glycerin-agar), forty-eight hours at 37°.  $\times$  60. Superficial colony.

IV. *Plate culture* (glycerin-agar), three days at 37°. Natural size. Superficial colonies. Later the same were larger, more wrinkled, and reddish.

V. *Potato culture*, six days at 22°. Later the same became still more wrinkled.

VI. *Microscopic preparation.* Glycerin-agar: (a) Three days at 37°.  $\times$  1000. Stained with fuchsin. (b) Two months at 22°.  $\times$  1000. Stained with fuchsin.

VII. *Microscopic preparation.* Smear from the peritoneal fluid of a guinea-pig, inoculated with butter.  $\times$  1000. Stained with tubercle bacillus stain. (From a preparation of Dr. Dieudonné.)

**Mycobacterium phlei.** Lehm. and Neum.

VIII. *Streak culture* (glycerin-agar), eight days at 22°. The culture at first is pale orange; later, it becomes darker and wrinkled.

IX. *Plate culture* (glycerin-agar), three days at 22°.  $\times$  60. Superficial colony.

X. *Plate culture* (glycerin-agar), eight days at 22°.  $\times$  60. Superficial colony.

XI. *Plate culture* (glycerin-agar), eight days at 22°. Natural size. Superficial colonies.

XII. *Microscopic preparation.* Glycerin-agar: (a) Three days at 37°.  $\times$  1000. Stained with fuchsin. (b) Two months at 22°.  $\times$  1000. Stained with fuchsin.

PLATE 64.

**Mycobacterium lacticola α planum. L. and N.**

I. *Streak culture* (ordinary agar), two months at 22°.

II. *Streak culture* (glycerin-agar), six days at 37°.

III. *Streak culture* (glycerin-agar), three months at 22°.

The culture at first is whitish; later, it becomes very intensely orange-red.

IV. *Streak culture* (gelatin), six days at 22°.

V. *Potato culture*, six days at 22°. Its appearance varies widely. Sometimes it is lighter, sometimes darker, sometimes moister, sometimes drier, sometimes smooth, sometimes wrinkled.

VI. *Plate culture* (gelatin), six days at 22°. × 60. (a) Superficial colony, resembling the colon; (b) deep colony.

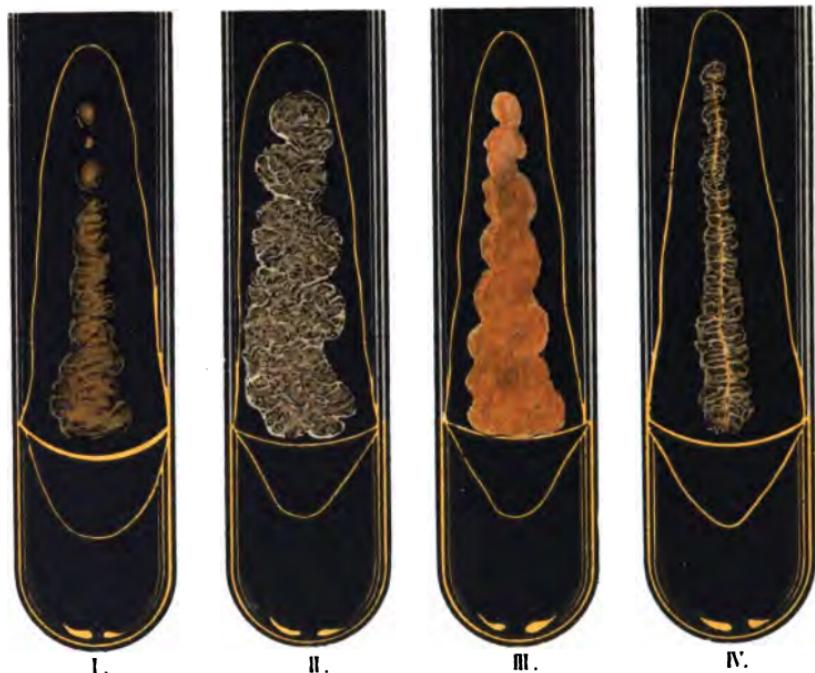
VII. *Plate culture* (gelatin), six days at 22°. Natural size.

VIII. *Plate culture* (glycerin-agar), three days at 37°. × 60. Superficial colony.

IX. *Plate culture* (glycerin-agar), three days at 37°. Natural size.

X. *Microscopic preparation*. Glycerin-agar, three days. × 1000. Stained with fuchsin. The size of the rods scarcely varies in very old cultures. There as here are found small and large, slender and thick rods.

Tab. 64.



I.

II.

III.

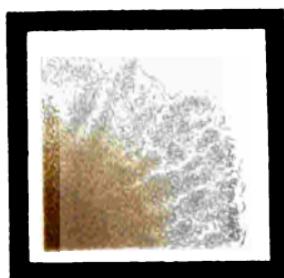
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VI.



VII.



VIII.

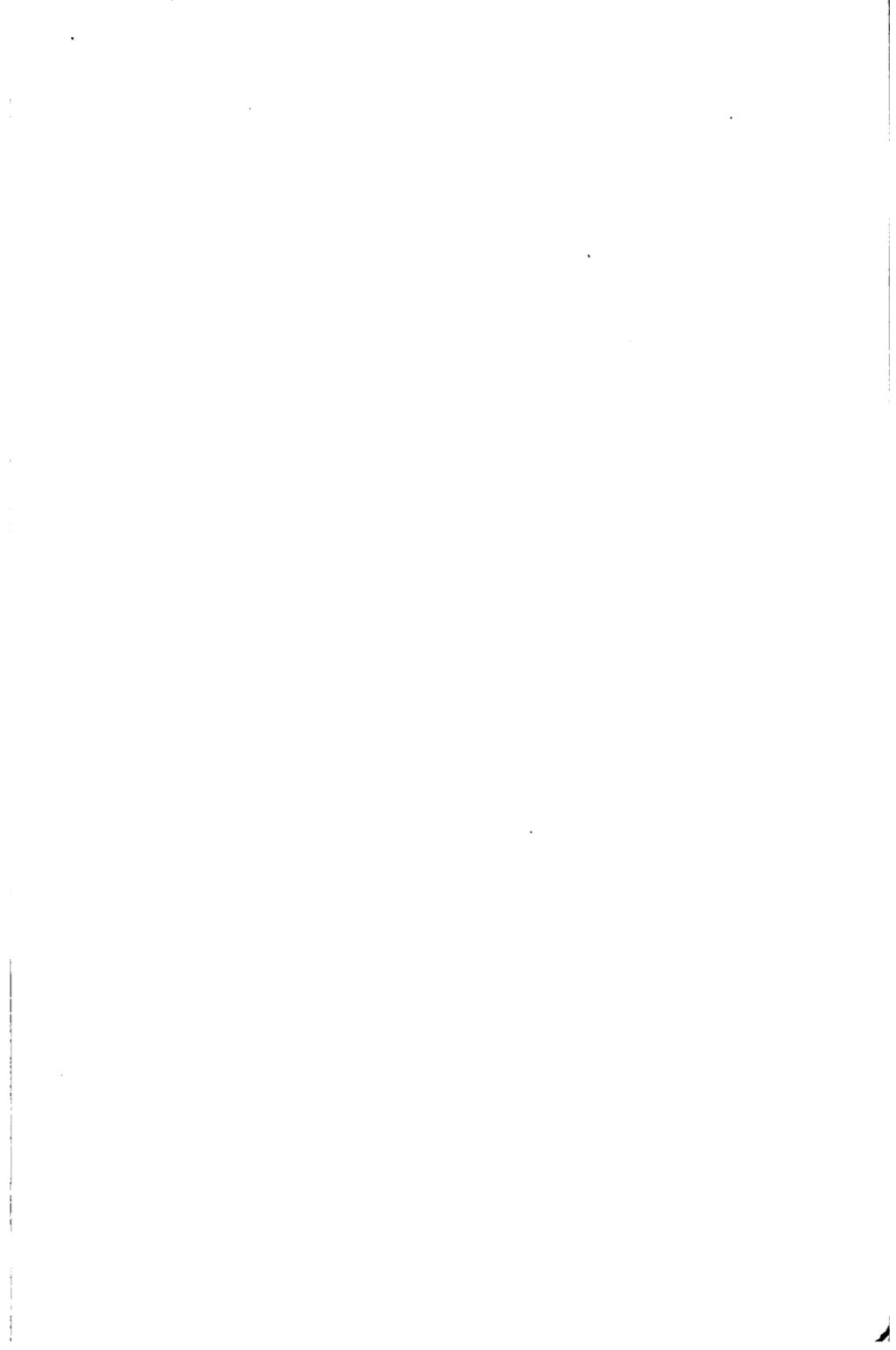


IX.



X.





Tab. 65.

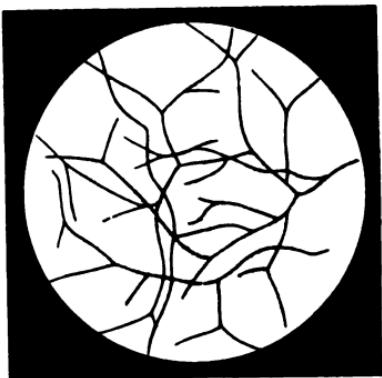
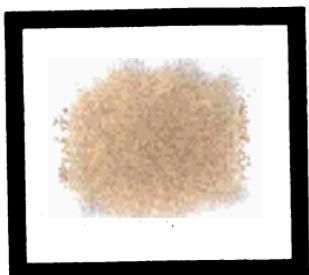


PLATE 65.

**Actinomyces bovis.** Harz.

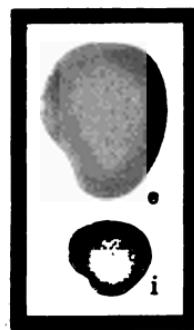
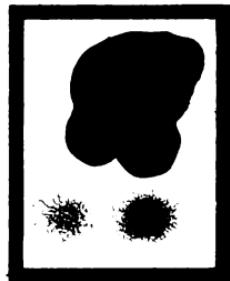
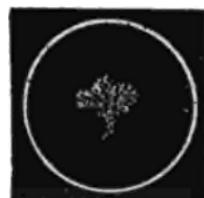
- I. *Agar streak culture*, six days at 37°.
- II. *Agar streak culture*, thirty days at 37°.
- III. *Gelatin stab culture*, fourteen days at 22°.
- IV. *Gelatin plate*, six days at 22°. Natural size.
- V. *Agar plate*, six days at 37°. Natural size.
- VI. *Agar plate*, six days at 37°.  $\times 60$ . Superficial and deep colony.
- VII. *Gelatin plate*, six days at 22°.  $\times 60$ . Superficial and deep colony.
- VIII. *Potato culture*, ten days at 37°. Natural size.
- IX. *Microscopic preparation*. Pure culture in bouillon, three days at 37°.  $\times 1000$ . Stained with fuchsin.

PLATE 66.

**Actinomyces farcinicus.** (Nocard.) Gasperini.  
(Farcin du bœuf.)

- I. *Agar streak culture*, eight days at 22°.
- II. *Gelatin stab culture*, twelve days at 22°.
- III. *Agar stab culture*, eight days at 22°. Stab canal.
- IV. *Agar stab culture*, eight days at 22°. Surface growth.
- V. *Gelatin plate*, ten days at 22°. Natural size.
- VI. *Gelatin plate*, ten days at 22°.  $\times 60$ . Superficial and deep colonies which are similar.
- VII. *Agar plate*, six days at 22°. Natural size.
- VIII. *Agar plate*, eight days at 22°. Upper colony superficial, lower ones deep.
- IX. *Potato culture*, seven days at 22°. Natural size.
- X. *Microscopic preparation*. Pure culture in bouillon, two days.  $\times 800$ . Stained with fuchsin.

Tab. 66.







Tab. 67.



I.



II.



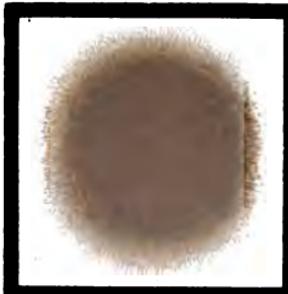
III.



IV.



V.



VII.



VIII.



VI.



IX.



X.

PLATE 67.

**Actinomyces chromogenes. Gasperini.**

- I. *Gelatin stab culture*, six days at 22°.
- II. *Agar streak culture*, six days at 22°.
- III. *Agar stab culture*, six days at 22°. Stab canal.
- IV. *Agar stab culture*, six days at 22°. Surface growth.
- V. *Gelatin plate*, eight days at 22°. Natural size.  
Appearance upon white background.
- VI. *Gelatin plate*, eight days at 22°. Natural size. Appearance upon dark background.
- VII. *Gelatin plate*, eight days at 22°.  $\times$  60. Part of a superficial colony.
- VIII. *Agar plate*, four days at 22°.  $\times$  60. Superficial and deep colony.
- IX. *Potato culture*, three days at 22°. Natural size.
- X. *Microscopic preparation*. Pure culture in bouillon, three days at 22°.  $\times$  about 1000. Stained with fuchsin.

PLATE 68.

Varia.

I. **Bacterium tussis convulsivæ** L. and N. From mucus, coughed up by a child with whooping-cough.  $\times$  1000. Ordinary fuchsin stain.

II. **Bact. ulceris cancrosi** (Kruse) L. and N. Section of an untreated soft ulcer of twelve days' duration. Stained according to Unna. (Copied from Peterson, über Bacillenfund bei Ulcus molle, C. B. XIII, Tafel 4.)

III. **Streptococcus meningitidis cerebrospinalis** (Weichselbaum). Lehm. and Neum. Smear preparation from meningeal exudate. Pus cells with flattened diplococci. (Copied after Jäger, Zeitschrift für Hygiene, Bd. 19, Tafel vi, Fig. 3.)  $\times$  1000.

IV. **Streptococcus meningitidis cerebrospinalis**. Pure culture, grown from cerebrospinal fluid.  $\times$  1000.

V. **Bacterium influenzae** (R. Pfeiffer) Lehm. and Neum. Smear preparation from nasal secretion.  $\times$  1000. Stained with fuchsin.

**Bacillus gangrænæ pulpæ. Arkövy.**

VI. *Gelatin stab culture*, ten days at 22°. The little hairs along the stab canal often become much longer.

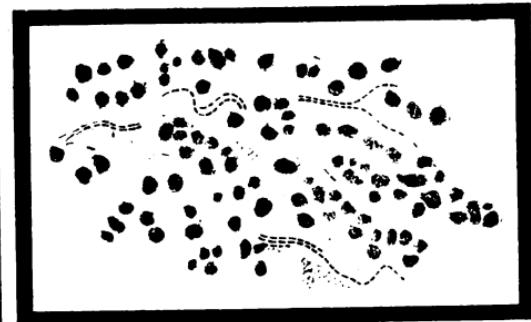
VII. *Agar plate*, three days at 37°. Natural size. Superficial colonies.

VIII. *Potato culture*, ten days at 22°. The wrinkling of the surface suggests the culture of the mesentericus.

IX. *Microscopic preparation*.  $\times$  1000. Stained with fuchsin. Before spore-formation.



I.



II.



III.



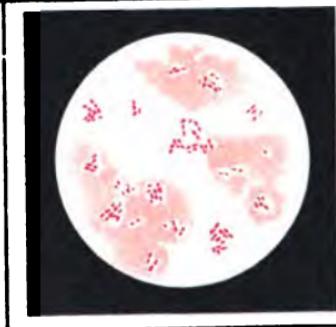
IV.



VI.



IX.



V.

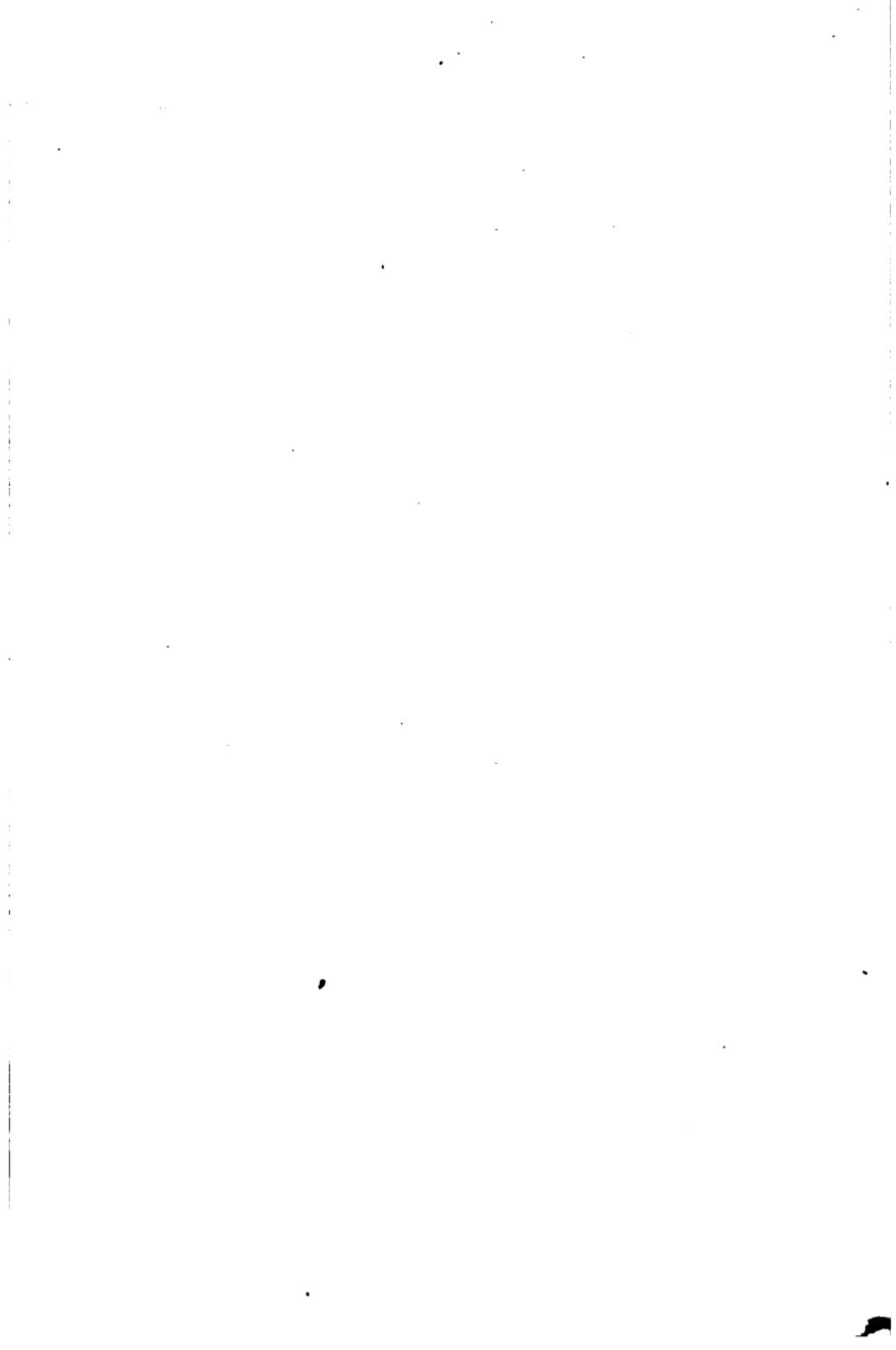


VIII.



VII.





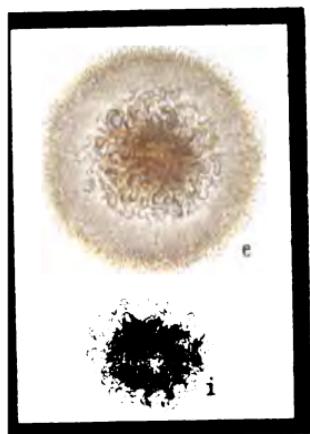
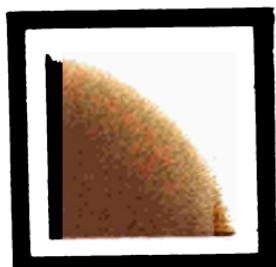


PLATE 69.

*Leptothrix epidermidis.* Biz.

- I. *Gelatin stab culture*, two days at 22°.
- II. *Agar streak culture*, two days at 22°.
- III. *Agar stab culture*, two days at 22°. Stab canal.
- IV. *Agar stab culture*, two days at 22°. Surface growth.
- V. *Agar plate*, two days at 22°. Natural size.
- VI. *Agar plate*, two days at 22°.  $\times 90$ . Part of a superficial colony.
- VII. *Agar plate*, two days at 22°.  $\times 90$ . Deep colony.
- VIII. *Gelatin plate*, two days at 22°. Natural size.
- IX. *Gelatin plate*, one day at 22°: (e) Superficial, (i) deep colony.
- X. *Potato culture*, three days at 22°. Natural size.
- XI. *Microscopic preparation*. Pure culture on agar, two days at 22°.  $\times 1000$ . Stained with fuchsin.
- XII. *Microscopic preparation*. Bouillon culture in hanging drop, two days at 22°.  $\times$  about 1000.







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